

Begin

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p-Hydroquinone. A. Kramovskii. Org. Chem. Ind.  
 (U. S. S. R.) 1, 104-8(1936).—The com. production of  
 p-HOCCINO by the method of Bickler (see 277, 85)  
 is discussed. —

ASS-SLA METALLURGICAL LITERATURE CLASSIFICATION

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1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

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CA

Leucoindoxanines. A. A. Krasnovskii. Rum. 20,848, April 30, 1937. Indoxanines, obtained by condensation of amines with nitrosophenols in  $H_2SO_4$ , are reduced with powdered  $Na_2S$  in  $H_2SO_4$  soln.

COMMON ELEMENTS

COMMON MATERIALS

COMMON PROCESSES

COMMON PROPERTIES

ASIA-SIA METALLURGICAL LITERATURE CLASSIFICATION

REGIONAL INDEX

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Nigrosine. A. A. Krusnovskii. *Org. Chem. Ind.*  
(U. S. S. R.) 4, No. 13, 14 (1947). --A preliminary  
communication of the studies of chemistry and optimum  
methods of production of Nigrosine base and its oil- and  
spirit-sol. derive. Chas. Blanc

ASAC-SLA METALLURGICAL LITERATURE CLASSIFICATION

IRON LITERATURE

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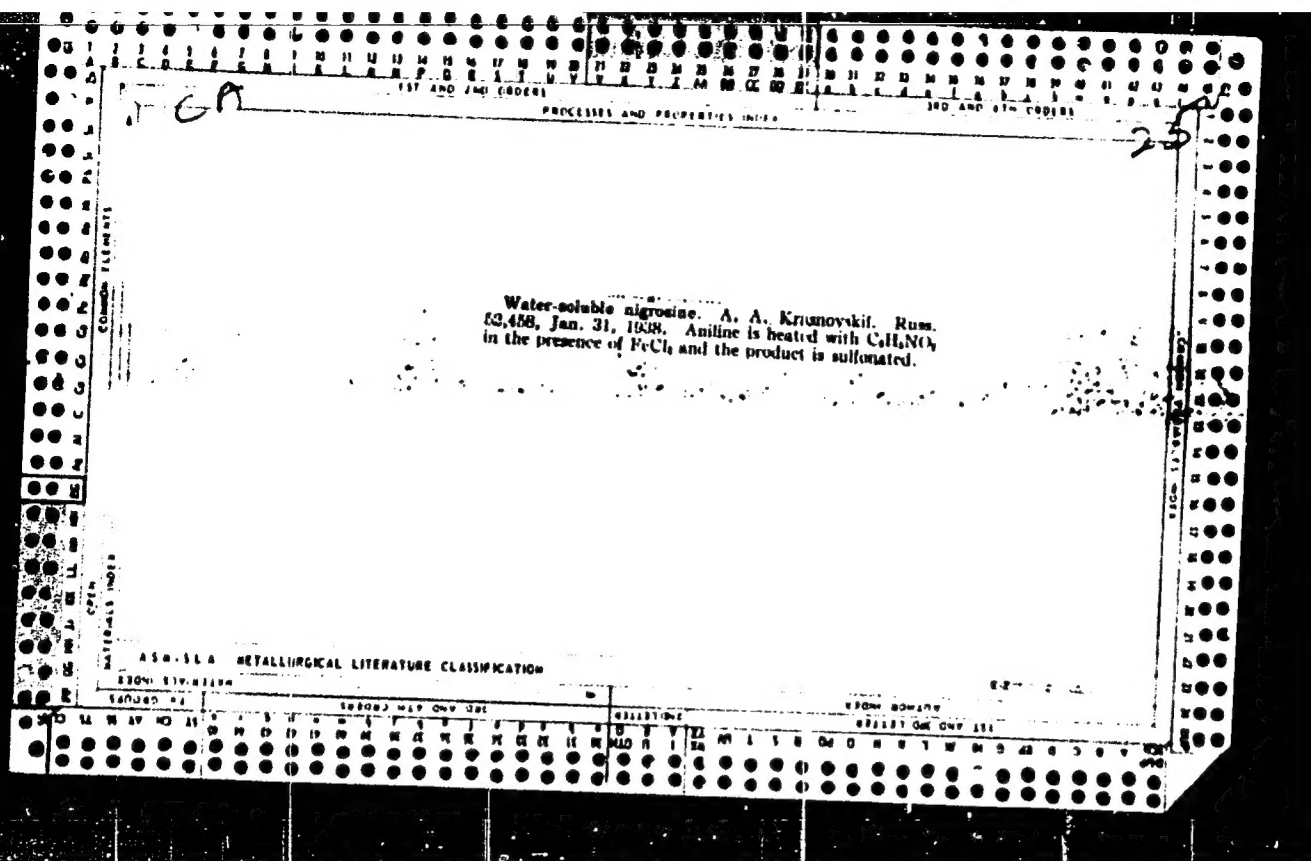
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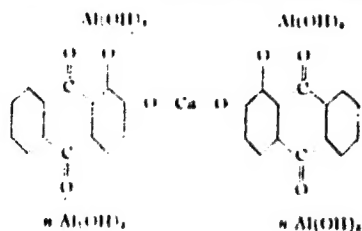
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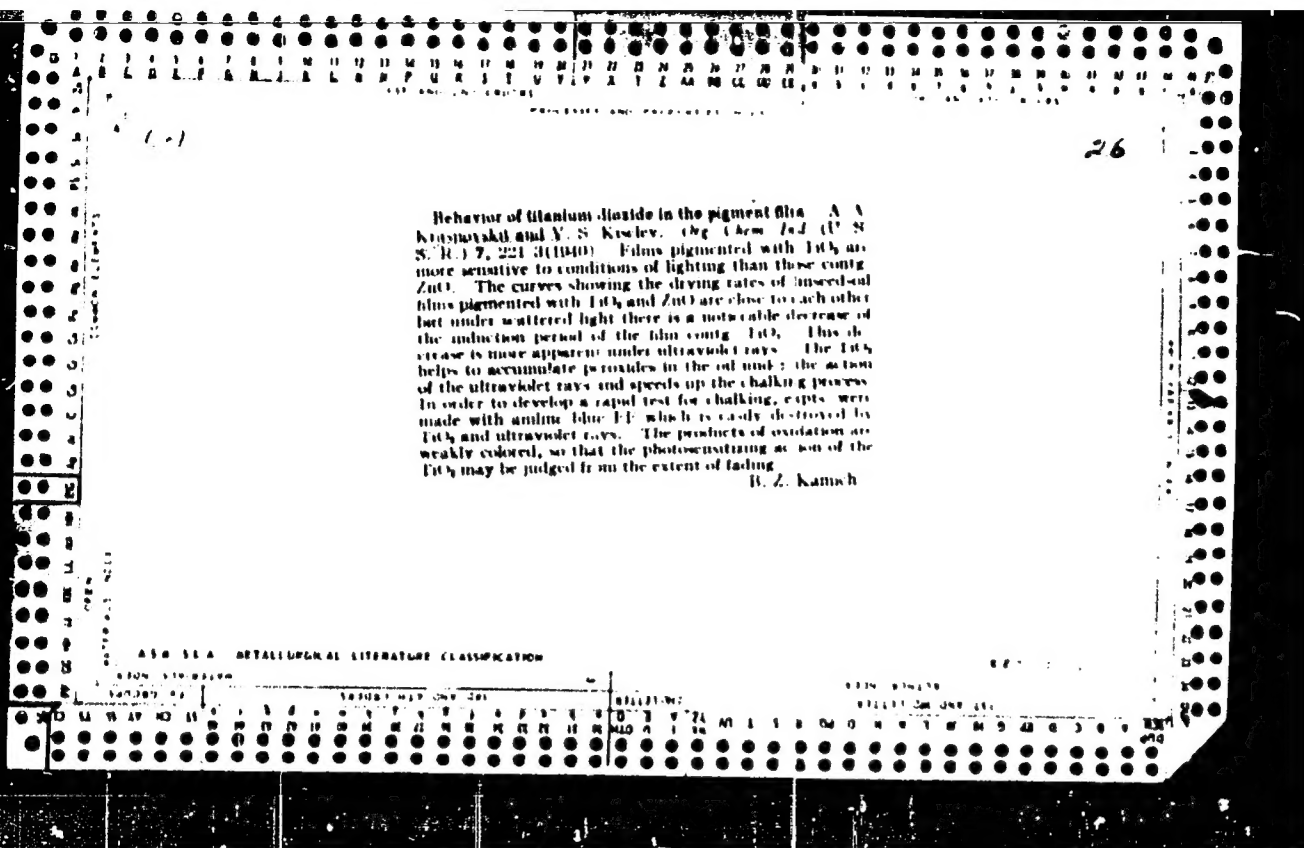
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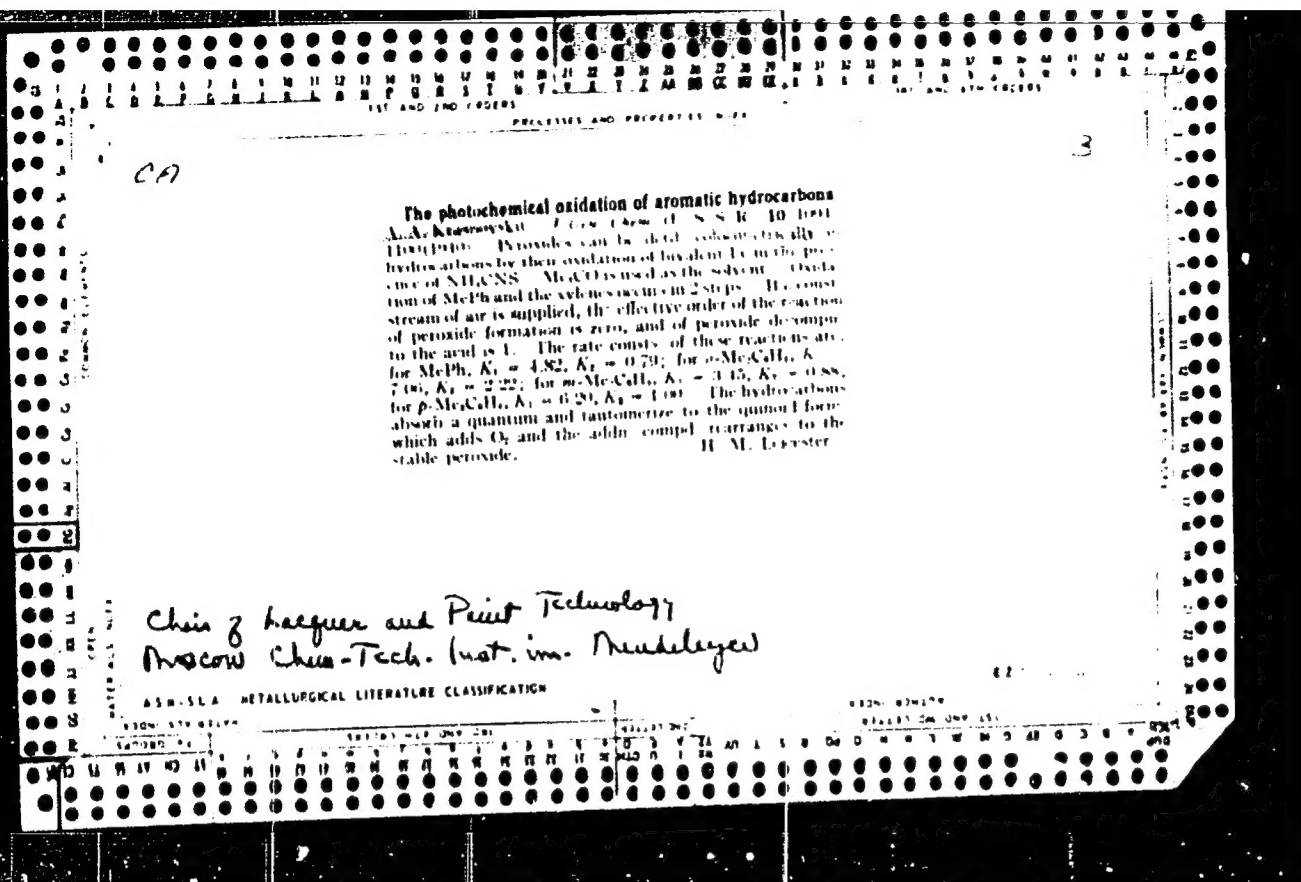
Mechanism of the formation of aluminum-calcium alizarin lake. A. A. Krasnovskii, *Org. Chem. Ind.* (U. S. S. R.) 5, 507 (1958). A review of the literature and preliminary experimental evidence show that in the 1st phase of the reaction of alizarin with  $\text{CaCl}_2$  and  $\text{Al}(\text{OH})_3$ , the  $\text{Ca}$  ions and alizarin are adsorbed on the surface of  $\text{Al}(\text{OH})_3$ . The desorption of the adsorbed alizarin forms a colored alizarate anion. On prolonged heating the complex components combine to give the chem. compd. I:

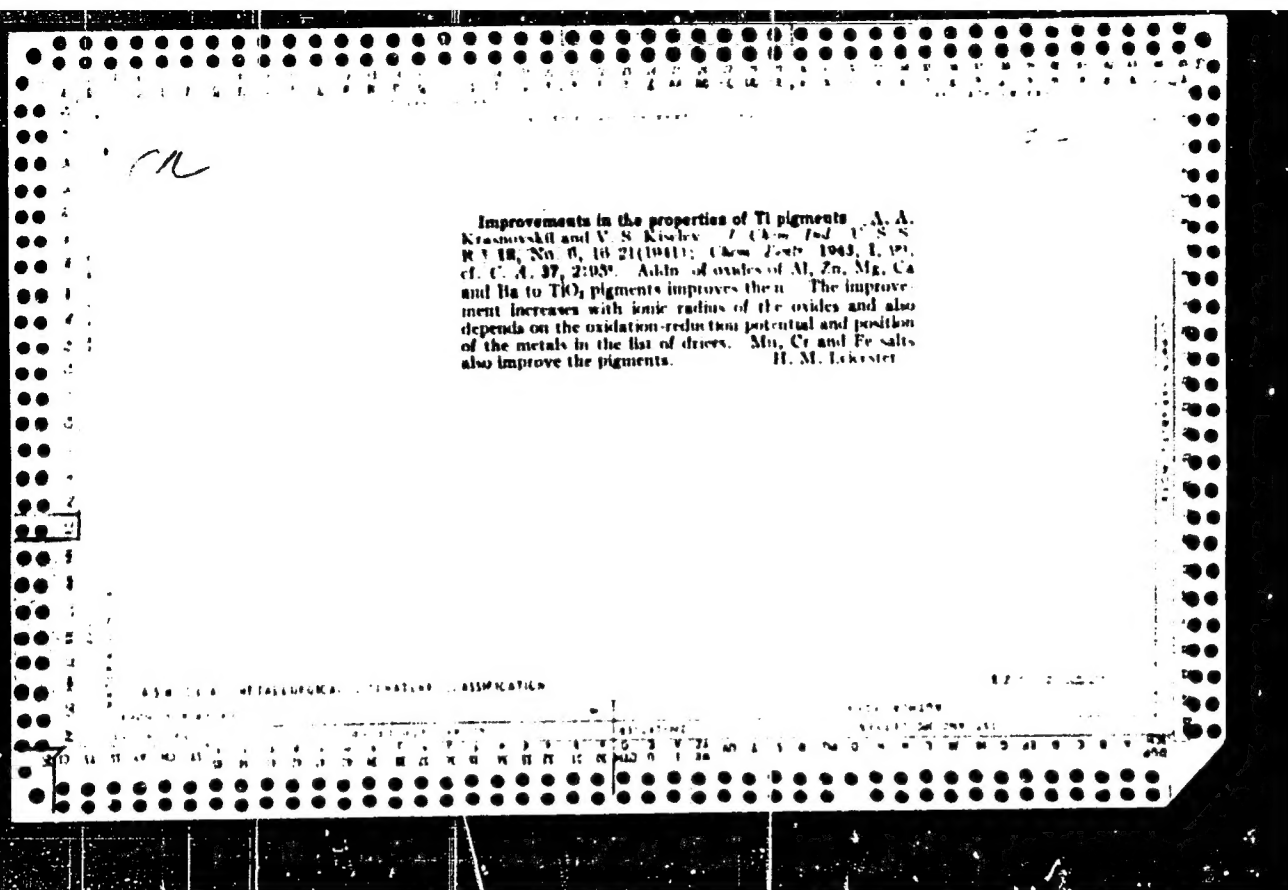


(I)

A light fast lake was obtained with  $n = 1$ . The structure of I is shown by the theoretical proportion of the chemically combined  $\text{Ca}$ , independent of the conditions of prepn., its definite fastness to light and the sp. x-ray crystal pattern, different from that of the reaction components and  $\text{Ca}$  and  $\text{Al}$  alizarates. The identical results obtained with alizarin and  $\text{Na}$  alizarate are an added proof of the chem. and not the adsorptive character of the lake. It is formed by the Werner coordinated intracomplex linkage of the 2  $\alpha$ -OH with O of the 2 CO in the 9 positions, the chem. interaction of the  $\beta$ -OH in 2 mols. alizarin with  $\text{Ca}$  to give a salt and the satn. of the residual valencies of O in the 2 CO groups in the 10 positions by adsorption of excess  $\text{Al}(\text{OH})_3$ . The difference in the color tones of the madder lake, obtained under various conditions and cations, depends not on the chem. compd. but on its dispersion and, probably, also on the quantity of retained water of hydration. The work is being continued. References: Chas. Blane.







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Luminous coatings A. A. Krasnovskiy, *J. Chem Ind. (U. S. S. R.)* 10, 15 (1911), *Chem Zentr* 1943, I, 540 Descriptive H. M. Lewister

ASD 55 A METALLURGICAL LITERATURE CLASSIFICATION

KRAVITSKY, A. A. (Moscow)

"Modern Genetics of Phototaxis" (p.113) by Kravitsky, A. A.

SO: Advances in Modern Biology (Uspekhi Sovremennoi Biologii) Vol XXI, No. 2, 1977

CA

Catalytic and photosensitized oxidation of ascorbic acid by phthalocyanines. A. A. Krasnovskii and G. P. Brin. *Compt. rend. acad. sci. U.S.S.R.* 23, 443 (1966) (in English). -The catalytic action of phthalocyanine (I) and its Mg (II) and Cu (III) complexes on the oxidation of ascorbic acid (IV) was compared with that of CuO (V) and CuSO<sub>4</sub> (VI). A kinetic study was made by the manometric technique of Warburg and Harcourt. H<sub>2</sub>O<sub>2</sub> generation is so slight that it does not affect the activity of the catalysts. Reactions were carried out both in darkness and in the light of a 200-w. incandescent lamp placed about 5 cm. from the bottom of the flat container. Reactions were carried out at 20, 30, and 40° ( $\pm 0.05^\circ$ ) and the container was oscillated 90-110 times/min. through an arc amplitude of 7 cm. Into the side arm of the container was introduced 0.75 ml. 1% IV (purity 90%), and into the middle portion 3 ml. thrice-dist. H<sub>2</sub>O and 30 mg. powder catalyst. In the tests with VI, the concn. was  $10^{-4}$  mole/l. I, II, and III were prepd. by Linström's method (*C.A.* 28, 61129). K<sub>1</sub> and K<sub>2</sub> give the graphs obtained of O absorbed vs. time in the case of III (in the dark and in the light) and in controls with IV in absence of catalyst. Data are given for all other catalysts as well. Reactions carried out in the dark conformed satisfactorily to the Arrhenius equation except when III was used. In this case, in the interval 20-30°, the temp. coeff. was 1.67; within the interval 30-40°, it was 1.1,

indicating diffusion kinetics in this last interval, which appear to be in harmony with the hydrophobic properties of III. The effective energy of activation cannot be used generally as a criterion of activity, but it was noted that the lowest values were observed with III and VI. Solns. of IV in H<sub>2</sub>O alone were found to be relatively stable, although the oxidation is accelerated slightly by light, despite the fact that IV does not absorb within the visible spectrum. The reaction may be catalyzed by dust particles. The value of the energy of activation is of the same order as for the reaction in the presence of V. With the exception of VI, illumination greatly accelerated the process. In the presence of light, catalytic and photosensitizing effects are superimposed on one another. II and III were the most active photochemically. Except in the case of III, the reaction in light obeys the Arrhenius equation. With III the rapid photoprocess is probably limited by a secondary chem. reaction, the value of the effective energy of activation in this case being lower than that when the reaction was carried out in darkness. The effective energies of activation of the photochem. process were calc'd. by subtracting the rate const. in the dark from that obtained in the light. The mechanism of the oxidation of IV in the presence of Cu<sup>2+</sup> is discussed briefly, the production of Cu<sup>+</sup> in the course of the catalysis of IV having been demonstrated by magnetometric measurements (cf. Tyson and Wiley, *C.A.* 30, 5315). 12 recent references are given.

Louis B. Wise

19. AND 2TH EXPERT

PROCESSES AND PROPERTIES INTER

18. AND 1TH EXPERT

3

Photochemistry of photosynthesis. A. A. Krasnovskii.  
Dokl. akad. na. U.S.S.R., Ser. biol. 1947, 377 (with Russian). Review. G. M. Krasnopol'skiy

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

19. AND 2TH EXPERT

CA

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Absorption spectra of magnesium phthalocyanine. V. B. Evstigneev and A. A. Krasnovskii (A. N. Bakh Biochem. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 30, 417-20 (1947).—Mg phthalocyanine crystd. from pyrroline retains 2H<sub>2</sub>O and free phthalocyanine which cannot be removed even by sublimation in vacuo. The free phthalocyanine can be removed by agitation with Me<sub>2</sub>CO until intense color appears and the soln. on evapn. gives a pure Mg deriv. The following max. were obtained: in Me<sub>2</sub>CO 605, 638, 661, 344 mμ; in EtOH 608, 640, 665, 344, 283; in Et<sub>2</sub>O 606, 638, 662, 344; in pyrroline 673, 647, 668, 340; in toluene 666, 638, 662, 344; in CCl<sub>4</sub> 672, 648, 668, 340; in MePh 672, 646, 668, 340; in 1,2,4-tetrahydronaphthalene 672, 646, 668, 347; in 1-BrC<sub>10</sub>H<sub>7</sub> 678, 649, 613, 355; in solid film 630, 335, 280. The spectra resemble those of chlorophyll in band positions and intensities. G. M. Kosolapoff

CA

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Photochemical oxidation of magnesium phthalocyanine and chlorophyll. A. A. Krasnovskii (A. N. Bakh Institute, Moscow). *Doklady Akad. Nauk S.S.S.R.* 56, 61, 24 (1947); cf. *C.A.* 43, 44. Solns. of Mg phthalocyanine (I) or chlorophyll (a + b) (II) in 95% EtOH were oxidized with atm. O<sub>2</sub> with a red filter (Schott RG-2) used for illumination. Photooxidation of I yields colorless products and in 18 min. the extinction coeff. of I at 665 mμ drops from 0.06 to 0.04; for II the change is from 0.90 to 0.19. Boiling the soln. of oxidation products of I leads to partial regeneration of the starting material, while ascorbic acid aids the reverse process at room temp. giving some 6-8% regeneration at 24-30% concn. of ascorbic acid in soln. KCl also aids regeneration. Long irradiation leads to irreversible oxidation, however. Photooxidation of II gives yellow products (abs. max. 500-600 mμ), which are reduced by ascorbic acid in the cold or on heating; KCl has no effect. However the process does not yield II since the abs. max. at 665 mμ is not increased; not over 10% oxidized II is reduced. Thus, photooxidation goes at the expense of reactions of long-lived excited state with dissolved O<sub>2</sub>; the excited state does not seem to be merely a tautomeric form, but may be a biradical. The primary labile product on heating is changed to a more stable substance with destruction of conjugated bond system. The labile products from I are more reactive than those from II, since even cold acid is capable of slow reaction with them. G. M. Krasnopol'skiy.

CA 10

Reversibility of chlorophyll oxidation and magnesium phthalocyanine by benzoyl peroxide A. A. Krasovskii (A. N. Bakh Biochem. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 98, 815-7(1947).—While  $H_2O_2$  in  $HClO_4$  does not oxidize the 2 pigments at  $10^{-4}$  M concn.,  $Bz_2O_2$  reacts and the reaction can be followed spectrometrically. The oxidized products can be partially reduced by ascorbic acid or  $PhNH_2$ ;  $C_6H_6$ ,  $CH_3CO_2H$ ,  $Ac_2O$ ,  $H_2$ , and oleic acid are inactive. Specimens that were heated or allowed to react for a long time lost their ability to be reduced. The results are given graphically. Spectral properties of the products of dark or photochem. oxidation are quite similar; Mg phthalocyanine gives colorless products while chlorophyll (a & b) shows absorption max. at 500-600 m $\mu$ . Oxidation with  $H_2O_2$  produces oxidation products which are more labile than those produced by photochem. oxidation, and can be reduced by ascorbic acid G. M. Kozlovskii

CA

110

Photosensitizing action of magnesium phthalocyanine and chlorophyll in solution. A. A. Krasnovskii and G. P. Ilin (A. N. Bakh Biochem. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 58, 1087 (1947); cf. C.A. 43, 144. Oxidation of oleic acid and oxidation of ascorbic acid were examined as to sensitization by Mg phthalocyanine or chlorophyll. In both cases the results were poor (given graphically). The mechanism appears to be that of reorientation of the electron spin in the sensitizers, putting them into excited state; the products combine with O and then transfer to the O-acceptors. In the case of oleic acid the process appears to continue as a chain reaction. No temperature dependence was found, indicating that the photochemical stage is the rate determining step. Chlorophyll, having labile H, in contrast to the phthalocyanine deriv., possesses stronger sensitizing activity. The photodegradation of the sensitizers decreases in the presence of the O-acceptors used. With phthalocyanine there is more destruction of the pigment during the reaction when oleic acid is present than is observed in its absence.

G. M. Kosolapoff

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Absorption spectra of the phthalocyanines V. B. Rytigheev and A. A. Kravtsovskii (A. N. Bakh. Khim. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 58, 1300-1302 (1947).—The following abs. max. were found: metal-free phthalocyanine: in dioxane 688 (1.5), 655 (1.4), 621 (0.46), 629 (0.44), 505 (0.20), 311 (0.70), in 95%  $H_2SO_4$  804 (1.14), 773 (0.83), 745 (0.63), 600 (0.23), 440 (0.21), 305 (0.55). Cu phthalocyanine in dioxane: 670 (2.8), 648 (1.4), 615 (0.1), 605 (0.43), 433 (0.14), 375 (1.0), 347 (0.86); in  $H_2SO_4$  791 (2.02), 748 (0.41), 608 (0.35), 440 (0.27), 305 (0.57). Sulfonated Cu phthalocyanine in dioxane was not run, but in MeOH it gave 670 (1.22), 643 (0.27), 343 (0.53), in  $H_2SO_4$  775 (1.03), 691 (0.22), 425 (0.14), 305 (0.43), and in water 628 (0.3), 335 (0.26) and 265 (0.2).

While the Cu deriv. is quite stable in concd.  $H_2SO_4$ , the metal-free phthalocyanine (prepd. by treatment of a Mg deriv. with concd.  $H_2SO_4$  and diln. with water, followed by careful washing of the ppt. decomp. at the rate of 3-4° C. per hr. The spectra suggest that the proton adds to phthalocyanine on N atoms that are part of the 18-membered conjugated system rather than on N atoms of the pyrrole rings. Abs. max. of chlorophyll *a* is 680 m  $\mu$  in EtOH are at 680 and 430 m  $\mu$ , while in  $H_2SO_4$  the first max. declines by 30% in intensity and shifts slightly toward 700, and the 2nd max. declines but slightly and shows a slight shift toward 400 m  $\mu$ .  
C. M. Kosolapoff

KRASNOVSKIY, A. A.

PA-77T9

USSR/Chemistry - Chlorophyll, Restoration Apr 1948  
Chemistry - Ascorbic Acid

"Reversible Photochemical Restoration of Chlorophyll  
by Ascorbic Acid," A. A. Krasnovskiy, Inst Biochem  
imeni A. N. Bakh, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LX, No 3

Studies possibility of photochemical restoration of  
chlorophyll and magnesium dicyanide found in green  
cells in compounds with ascorbic acid, citric,  
racemic and ethyl esters, phenylhydrazine, and hydro-  
quinine. Submitted by Acad A. N. Terent'ev 19 Feb 1948

77T9

USSR/Chemistry - Chlorophylls, Fluorescence May 1948  
Chemistry - Pthalocyanine, Magnesium Derivatives

"The Attenuation of the Fluorescence of Magnesium Pthalocyanine and Chlorophyll by Foreign Molecules," V. B. Yevstigneyev and A. A. Krasnovskiy, Inst. Biokhim. imeni A. N. Bakh, Acad Sci USSR, 4 pp

"Dokl Ak Nauk SSSR" Vol IX, No 4

Description and results of subject experiments. Fluorescence attenuations of magnesium pthalocyanine and chlorophyll are similar, which proves that effect is not connected with labile hydrogen atoms in chlorophyll molecule and shows resemblance between tetrazolopyridin and porph. In systems of conjugate double bonds. Molecule oxidizers with electron affinity (quinone, oxygen) greatly attenuate fluorescence of pigments investigated while reducers (hydroquinone, ascorbic acid, NaI and KI) are far less active. Submitted 12 Feb 1948.

7796

KRASNOVSKIY, A. A.

KRASNOVSKIY, A. A.

PA 8/49T5

USSR/Chemistry - Photography  
Chemistry - Photochemistry

Jul 48

"Oxidation Reduction Reactions Photosensitized by Chlorophyll and Magnesium Pthalocyanine, Which Occur Due to an Increase in the Free Energy of the System," A. A. Krasnovsky, Inst of Biochem Plant A. N. Bakht, Acad Sci USSR, 34 pp

"Dok Ak Nauk SSSR" Vol LXI, No 1

From series of experiments, Krasnovsky discovered the possibility of a reversible photochemical reduction by ascorbic and pyroracemic acid of a number of dyes, the most interesting being riboflavin and safranine T. (Ascorbic acid, 8/49T5

USSR/Chemistry - Photography (Contd) Jul 48

for which  $E_0 = +0.05V$  at  $pH = 7$ , cannot reduce riboflavin ( $E_0 = -0.22V$ ) and safranine T ( $E_0 = -0.29V$ ) in darkness). Describes experiments in detail. Tabulates and plots results. Submitted 22 Apr 1948.

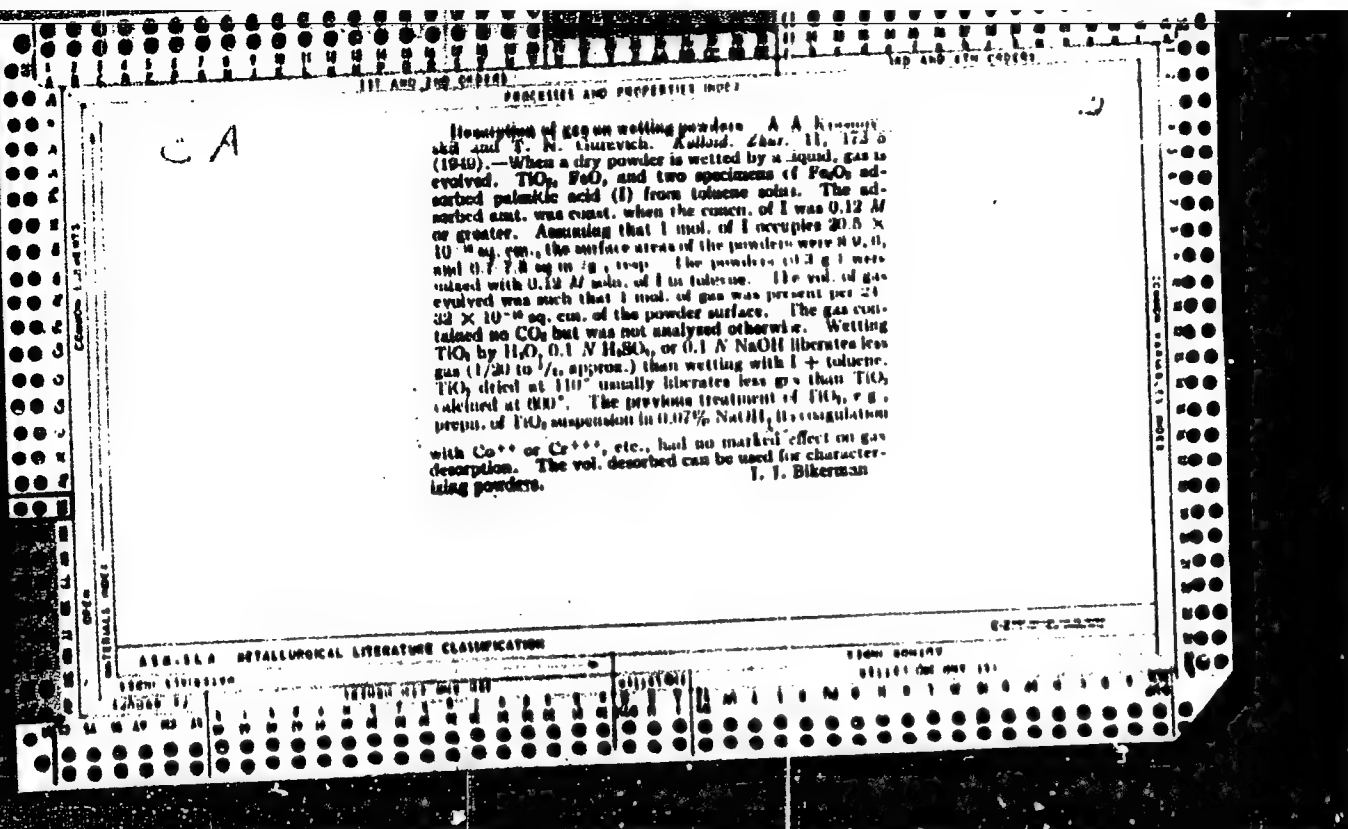
8/49T5

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Optical and photochemical properties of chlorophyll in different forms of combination. A. A. Krasnovskii and G. P. Ilin. *Doklady Akad. Nauk S.S.S.R.* 48, 163-5 (1948).—The photochem. activity of chlorophyll preps., as indicated by activation of reversible oxidation of ascorbic acid, varies with their fluorescence. Max. absorption of red light is at 677-678 and at 663-670 mμ in living leaves, and at 670-680 mμ for nonfluorescent chlorophyll exts. The following preps. of chlorophyll exhibited both fluorescence and photochem. activity: solns. in org. solvents, fatty acids, fats, and keratin, and aq. emulsions thereof, solns. in aq. ethanol-detergent mixts., aq. colloidal solns. of chloro-

phyll-protein (zein, gliadin, casein, fibroin, wool keratin, ovalbumin) complexes, and chloroplasts and granules in aq. detergent solns.  
B. A.



KRASNOVSKIY, A. A.

A. N. Terenin and A. A. Krasnovskiy

"The Problem of Migration of Energy in Biological Processes" appeared in the Soviet journal "The Results of the Physical Sciences," 1949, volume No. 27, No. 1.

Full translation available.

XXV-1

KRASNOVSKIY, A. A.

PA 46/49T11

USSR/Chemistry - Chlorophyll  
Chemistry - Photochemistry

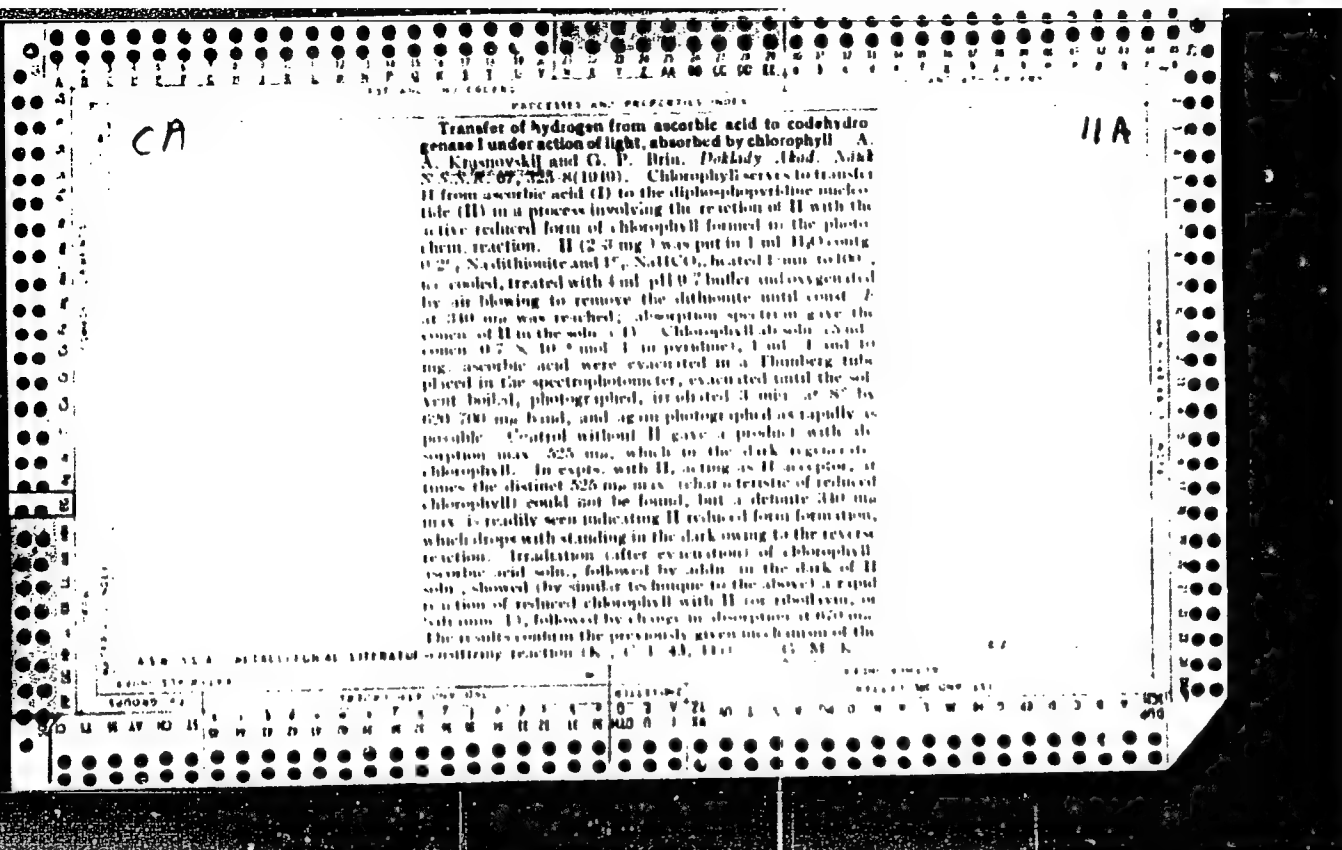
Jun 49

"Photochemical Properties of Protochlorophyll,"  
A. A. Krasnovskiy, K. K. Voynovskaya, Inst Biochem  
imeni A. N. Bakh, Acad Sci USSR, 4 pp

"Dok Ak Nauk SSSR" Vol LXVI, No 4

Studied characteristics of protochlorophyll separated  
from cells to obtain data on its possible transforma-  
tions under action of light. Characteristics studied:  
absorption spectrum of protochlorophyll, in solution,  
photochemical reduction of protochlorophyll, and  
hydrogen transfer sensitized by protochlorophyll.  
Submitted by Acad A. N. Terenin, 5 Apr 49.

46/49T11



684

KRASNOVSKIY, A.A.

NEW 51  
Enzymes

Transfer of hydrogen from ascorbic acid to nicotinamide I  
by action of chlorophyll modified by illumination. A. A. Krasnovskiy  
and G. P. Bein (C.R. Acad. Sci. U.R.S.S., 1946; 67, 325-328).  
Illumination of chlorophyll in pyridine in presence of ascorbic acid  
leads to production of reduced chlorophyll, which reacts in the dark  
with a number of H<sup>+</sup> acceptors, such as coenzyme I,  
Safranine-T, riboflavin, and O<sub>2</sub>. Reduced coenzyme I is  
able to donate its H<sup>+</sup> to dehydroascorbic acid in absence of light  
H. TAVNOR.

CA

11D

Conditions for reversible transformations of chlorophyll under the influence of light. A. A. Krasnovskiy, A. P. Ibrim, and K. K. Volnovskaya (A.N. Bakh Institute of Acad. Sci. U.S.S.R.), *Doklady Akad. Nauk SSSR*, 69, 381 (1940). —The reverse reaction of chlorophyll in the dark was observed only in org. solvents or in the presence of some bases, such as pyridine, histidine, or imidazole. Examn. of absorption spectra of such solns. reveals a shift of 662 mμ band in Et<sub>2</sub>O to 660 mμ in pyridine, while the 418 band shifts to 412 mμ, with the displacement of the entire spectrum. Photoreduction of chlorophyll a was observed only with ascorbic, dihydroxy-maleic acids, cysteine, PhNHSH, and H<sub>2</sub>S, all giving reduced chlorophyll with an abs. max. of 625 mμ, which oxidizes in the dark to chlorophyll. In chlorophyll a the reversibility of photoaction is high and the spectrum of regenerated product is that of the original, although in the presence of much ascorbic acid considerable amts. of irreversibly formed products are formed. In chlorophyll b the reversibility of photoaction is low, the product has an abs. max. 415 mμ (in pyridine), and removal of pyridine from the product by H<sub>2</sub>O washing and extr. with pet. ether gave the product with abs. max. at 644 and 412 mμ which may be a product of irreversible reduction of the C=O group of chlorophyll b. G. M. Kosolov

KRASNOVSKIY, A.A.

Photosynthesis in plants (biochemical aspects). Uspekhi Biol. Khim.  
1, 473-506 '50. (MLBA 5:8)  
(CA 47 no.14:7042 '53)

c A

11D

Reactions of the reduced form of chlorophyll. A. A. Krasnovskii and G. P. Izm (A. N. Bakht. Biochem. Inst. Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk*

S.S.S.R. 73, 1249-1250 (1950). Chlorophylls a and b, reduced by ascorbic acid in pyridine with irradiation (red filter) at 10° until a pink color formed, was treated with various reagents and the color, directly examined spectrophotometrically (extinction at 650 mμ). The dark reaction of ascorbic acid itself in pyridine was similarly measured with phenanthroline (oxidation-reduction potential 0.24 v. at pH 7), thionine (0.062 v.), and methylene blue (0.011 v.), all of which has one deoxidized state (curves are given). Nile blue (0.42 v.), riboflavin (0.22 v.), methylene blue (0.21 v.), and methyl red (0.19 v.) were unaffected. Reactions with the reduced chlorophyll system with reagents having pos. oxidation-reduction potential showed regular oxidation of the former (curves given) by the above dyes, quinone, humatin, dehydroascorbic acid, Fe<sup>3+</sup>, NO<sup>2+</sup>, Nth<sup>+</sup>, and O<sub>2</sub>. The reaction with dehydroascorbic acid is much slower than that with the dyes and the results above may be explained either by direct action of the dyes on reduced chlorophyll or by their intermediate action on dehydroascorbic acid, forming a reactive monodehydroascorbic acid, which then reacts with reduced chlorophyll. Reduced chlorophyll similarly reacts rapidly with the above dyes with neg. oxidation-reduction potentials that do not react with ascorbic acid in the dark, diphosphopyridine nucleotide also reacts, but xanthine does not. Hence the potential of the chlorophyll system is about -0.35 v. Maleic acid also reacts, (CO<sub>2</sub>H)<sub>2</sub> retards reoxidation, while pyruvic, citric, succinic, fumaric, lactic, and acetic acids have no action. The temp. coeff. of reoxidation of reduced chlorophyll is small and indicates an activation energy of about 1.5 kcal/mole. (C. M. Krasnovskii)

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A study of the products of reduction of chlorophyll, its derivatives and analogs, by means of Timiryazev reaction. L. M. Kosobutskaya and A. A. Kramovskiy. *Doklady Akad. Nauk S.S.S.R.* 74, 1763-6(1950); *Et. Nature* 32, 342(1985); 34, 62(1986); *Compt. rend.* 102, 686(1980).— Reduction of the pigments with Zn dust, AcOH-pyridine-H<sub>2</sub>O system in *vacuo*, followed by reoxidation and spectrographic examn. of the products, showed that all chlorophyll-like substances studied (chlorophylls a and b, Zn-pheophytins a and b, and the Cu analogs) yield a product with abs. max. at 661 and 431 mμ, corresponding to spectrum of Zn pheophytin. Reduction product of Mg phthalocyanine is colored and does not absorb in visible region. The reduction products turn green on admission of air. All reduction products show reduced intensity of a'm. maxima; with concd. chlorophyll soln. a max. at 610-60 mμ is found; the chem. nature of the products is unknown. Much pigment is destroyed irreversibly. G. M. K.

CA

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Relation between atmospheric stability of pigmented paint films and the pigment photosensitized formation of peroxide compounds. A. A. Kravtsovskii and F. N. Gurevich. *Doklady Akad. Nauk S.S.S.R.* 74, 560-72 (1950). --In case of  $\text{TiO}_2$ , peroxides were detd. by a colorimetric method based on measuring intensity of coloration from reaction of  $\text{Fe}^{+++}$  and CNS; accelerated atm-stability tests were made under a C arc of 2000 w. In case of  $\text{ZnO}$ , measurements were made of the fading of methylene in an aq. suspension of  $\text{ZnO}$  instead of direct detn. of peroxide.  $\text{TiO}_2$  with the structure of anatase was photochemically more active than rutile. Muffle  $\text{ZnO}$  had bright yellow fluorescence and  $\text{ZnO}$  obtained by calcination of carbonates had dark brown fluorescence. Usually, samples least active photochemically had least bright fluorescence; it is not clear, however, to what extent the dislocation of the crystal lattice of  $\text{ZnO}$  which detn. its fluorescence also detn. its photosensitizing activity. The formation of the peroxides leads to the accelerated destruction (photooxidation) of the binder around the particles of the pigment of the upper layer as a result of which "chalking" takes place. H. Z. Kamich

CA

3

**Decolorization of methylene blue under the action of x-rays.** Ya. L. Shekhtman, A. A. Krasnovskii, and I. V. Vereshchinskii (A. N. Bach Biochem. Inst. Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.* 74, 207 (1974). The decolorization of aq. solns. of methylene blue, 30-170 micromoles in 0.1 N H<sub>2</sub>SO<sub>4</sub>, was investigated as a function of the dose of x-rays, up to 10,000 rontgens. At the latter dose, the yields of the decolorization reaction were from 0.147 to 0.57 micromole l. per 1000 rontgens, which corresponds to 0.084-0.21 mols. per ion pair. Plots of the fall of the absorption coeff. in 660 mμ are nearly linear, and practically parallel for the different initial concns. Treatment of the reaction vessel with CrCl<sub>3</sub>, followed by rinsing with H<sub>2</sub>O, increases the decolorization at equal doses. Addn. of quinone, hydroquinone, glucose, or glycerol blocks the decolorization; this blocking effect first increases almost linearly with the log of the amt. added, then levels off. Exposure to x-rays results primarily in a decomposition of the solvent, giving rise to free radicals and ions which, in turn, react with the dissolved dye. The blocking effect of the org. substances is due to their interaction with the primary radicals and ions. N. Thon

CA

Photocatalytic action of some metal oxides. A. A. Krasnovskii and T. N. Gurevich. *Doklady Akad. Nauk S.S.S.R.* 78, 715-18(1950).—(1) The rate of oxidation by  $\text{O}_2$  of linseed oil and of linoleic acid in toluene or  $\text{EtOH}$  soln., heterogeneously catalyzed by metal oxides, i.e. the rate of absorption of  $\text{O}_2$  (formation of peroxides by addn. to the double bond) is accelerated by simultaneous illumination with long-wave ultraviolet (400-410 m $\mu$  or shorter) absorbed by the solid oxide but not by the reactant and solvent. The promoting effect of the light is expressed by  $\phi = k_2/(k_1 + k_2)$ , where  $k_1$  = zero-order rate of the dark catalyzed reaction,  $k_2$  = of the photochem. reaction without catalyst,  $k_2$  = of the catalyzed reaction on illumination. For linoleic acid in toluene (1 ml. of 10% soln.), at 40°, with 0.2 g. oxide, 3 ml. solvent, on  $\text{TiO}_2$  (96% anatase structure)  $k_1$ ,  $k_2$ ,  $k_3$  (in cu. mm.  $\text{O}_2$ /min.), and  $\phi$ , are = 0.39, 0.67, 4.3, and 4.0; on  $\text{ZnO}$  (from  $\text{ZnCO}_3$ ) 1.77, 0.67, 1.87, 0.79; on  $\text{Fe}_2\text{O}_3$  0.0, 0.67, 0.0, —; on  $\text{PbO}$  0.79, 0.67, 4.2, 2.8; on  $\text{PbO}$  2.46, 0.67, 5.05, 1.6; on  $\text{Cr}_2\text{O}_3$  0.20, 0.67, 0.22, 0.25. Rutile- $\text{TiO}_2$  shows a weaker effect than anatase. With  $\text{TiO}_2$ , all reactions are somewhat slower in alc. with 5-6%  $\text{H}_2\text{O}$  than in toluene, but  $\phi$  is about the same in the 2 solvents. Probably owing to complete dehydration,  $\text{TiO}_2$  heated to 800° shows an increased catalytic activity; the photochem. activity of  $\text{TiO}_2$  sample dried at 110° and heated to 800° is about the same. Adsorption of  $\text{Cr}^{3+}$  and  $\text{Co}^{2+}$  ions ( $\sim 10^{-4}$  g./g.) increases the catalytic and lowers the photochem. activity

of  $\text{TiO}_2$ . (2) The effects of illumination on the rate of the catalytic decompn. of  $\text{H}_2\text{O}_2$  at 40° (3 ml.  $\text{H}_2\text{O}$ , 1 ml.  $\text{H}_2\text{O}_2$  soln. of c %, amt. of catalyst = g) are given by the following data (c, a,  $k_1$ ,  $k_2$ ,  $k_3$ , and  $\phi$ ): on  $\text{ZnO}$ , 1, 0.1, 17.3, 0.1, 20.0, and 1.14; on  $\text{TiO}_2$ , 1, 0.1, 1.2, 0.1, 5.6, and 4.6; on  $\text{Fe}_2\text{O}_3$ , 1, 0.1, 4.1, 0.1, 4.4, and 1.05 (practically no effect); on  $\text{Cr}_2\text{O}_3$ , 1, 0.1, 0.4, 0.1, 0.4, and 0.8 (no effect); on  $\text{PbO}$ , 1, 0.1, 4.1, 0.1, 4.4, and 0.8 (no effect); on  $\text{PbO}$  (at 25°) 0.03, 0.01, 1.04, 0.03, 5.52, and 3.3; on  $\text{PbO}$  (at 25°) 0.03, 0.01, 3.23, 0.03, 0.75, and 3.0. Illumination of an  $\text{Fe}_2\text{FeO}_4$  electrode gave no promoting effect on the decompn. of  $\text{H}_2\text{O}_2$ . No effect of light was observed on the rate of the catalytic decompn. of  $\text{H}_2\text{O}_2$  in toluene. (2) The photocatalytic effect is pronounced with  $\text{TiO}_2$  and  $\text{PbO}$ , and  $\text{PbO}$ , to a lesser extent on  $\text{ZnO}$ . Of these oxides, only  $\text{ZnO}$  has a marked fluorescence at room temp.;  $\text{ZnO}$  and  $\text{PbO}$  are known to be photoconductors, but there are no data on the photocond. of  $\text{TiO}_2$ . The lifting of an electron to the conduction zone through absorption of a quantum facilitates the electron transition between the adsorbed mol. and the surface; and thus lowers the activation energy. The desensitization by adsorbed  $\text{Cr}^{3+}$  and  $\text{Co}^{2+}$  ions may be linked with the reverse process. The lowering of the potential barrier through illumination of the solid may, on the other hand, be linked with a transfer of vibrational energy to the adsorbed mol. through degradation of the quantum absorbed in the lattice. The chem. effect of the light-promoted catalysis amounts to formation of peroxide-type compds. on the surface which initiate chains in the vol. of the soln. The decompn. of  $\text{H}_2\text{O}_2$  is no doubt initiated by free OH radical formed on the surface upon absorption of a light quantum.

N. Thon

BRIN, G.P.; KRASNOVSKIY, A.A.

Effect of compounds with various oxidation-reduction potentials on photosynthesis and respiration of Elodea. Biokhimiya '51, 16, 453-460. (MLRA 4:10) (BA -AIII My '53:728)

USSR/Biochemistry - Radiation Effects Nov/Dec 51

"Action of Ultraviolet Rays on Photochemical Activity of Chloroplast Substances," I. V. Vereshchinsky, A. A. Krasnovskiy, Inst Biochem Imeni A. N. Bakht, Acad Sci USSR, Moscow

"Biokhim" Vol XVI, No 6, pp 621-626

Ultraviolet rays impair photochem activity of chloroplasts. This is not connected with reduction in quantity of extractible chlorophyll or with changes in the character of its binding to the chloroplast substance. It is suggested

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USSR/Biochemistry - Radiation Effects Nov/Dec 51  
(Contd)

that the inactivation is primarily due to damaged labile links of the chloroplast enzyme system.

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KRASNOVSKIY, A. A.

C A

11c

Reversible photochemical reduction and oxidation of bacteriochlorophyll and bacteriopheophytin. A. A. Krasnovskii and K. K. Volnovskaya. *Doklady Akad. Nauk S.S.S.R.* 81, 870-82 (1951); cf. C.A. 42, 6867a; 43, 2402g.

Oxidation and reduction changes in purple sulfur bacteria were studied spectrographically with the technique employed earlier with chlorophyll. Ascorbic acid,  $H_2S$ , and  $Na_2S$ , were employed as reducing agents and  $O$  with photo-oxidation as the oxidizing agent. Bacteriochlorophyll (I) is rapidly photooxidized by  $O$  forming a peroxide-type product with spectrum unlike that of a porphyrin. Irreversible process (by  $\alpha$ -quinone) forms a chlorophyll-like product, i.e., with dehydrogenation and formation of an isolated double bond. Infrared abs. max. declines during photoreduction in I and in bacteriopheophytin (II) indicating the reaction does not proceed at isolated double bonds. I is more readily oxidized and less easily reduced than II. I is photooxidized reversibly more readily than chlorophyll, but is less readily reduced. Pheophytins are reduced readily and completely.

G. M. Kowaloff

[illegible]

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11-0

Formation of active reduced compounds that survive the illumination period in colloidal solutions of green leaf matter. A. A. Krasnevskii and L. M. Kosobutskaya (A. N. Bakh Institute of Botany, Moscow). *Doklady Akad. Nauk S.S.S.R.* 82, 761-4 (1952). — Chloroplast suspension from kidney bean, prepd. from the leaves by grinding with phosphate buffer at pH 7 and filtering, gave the green soln. that was used for the study in which dichlorodimethylphenol was the substrate having a convenient and high abs. max. at 600 mμ. Other H acceptors (thionine, methylene blue, Nile blue, riboflavin, safranin, neutral red) were also used. Illumination of the test soln. at 0° increases the concn. of active substances that can reduce the "indicators" by 10-30%; entry of air causes rapid reoxidation. By calcn. the molar concn. of the active photoproducts that survive illumination is shown to be 6-8% of the chlorophyll concn. in the soln. The substances in question are not transformation products of chlorophyll, but appear to be a reduced form of an intermediate system conjugated with chlorophyll. Photoreduction of many substances by chloroplasts does not go by direct photoreaction, but includes a dark phase of reaction with the oxidant of the active products formed during the photoreaction. G. M. Kosolapoff

CA 11 D

**Isolation of phycoerythrin from red algae, and its spectral and photochemical properties.** A. A. Krasnovskii, V. N. Evstignejev, G. P. Belin, and V. A. Gavrilova (I. N. Bakh Biochem. Inst., Moscow). *Doklady Akad. Nauk S.S.S.R.* 82, 947-50(1962).—The best source from which phycoerythrin can be extd. by 24-hr. treatment with  $H_2O$  is *Callithamnion ruberum*. This product can be isolated by pptg. proteins with  $(NH_4)_2SO_4$  and chromatographing on tricalcium phosphate, the raspberry-colored band of phycoerythrin being found above the blue phycoerythrin band. Washing (development) with 0.15 M  $NaH_2PO_4$  is satisfactory. Ultracentrifuge studies show that the soln. contains 2 protein components,  $S_{20} = 12.07 \times 10^{-12}$  sec. and  $4.08 \times 10^{-12}$  sec., mol. wts. being about 300,000 and 50,000, resp. Tiselius electrophoresis technique gives one sharp and one shallow peak. At isoelectric point of pH 4.2, the intensity of absorption is least. The main absorption max. at 675 m $\mu$  is highest at pH 7.8. The 665-m $\mu$  absorption band follows Beer's law. The substance displays fluorescence without concentrational quenching. Photooxidation in air is negligible in aq. soln., but  $H_2O_2$ , diamine, or pyridine accelerates it considerably; during oxidation the absorption max. at 665 and 640 m $\mu$  decline more rapidly than at 496 m $\mu$ , possibly owing to destruction of link between protein and erythrobin. Expts. with photoreduction of phycoerythrin by ascorbic acid showed stability of the compd. in this respect. The substance is not capable of realization of the isolated chloroplast reaction (photochem. evolution of  $O$  of  $H_2O$ , coupled with reduction of quinones); not only that, but it actually hinders the spontaneous oxidation of ascorbic acid and it cannot participate in  $H$  transfer from ascorbic or pyruvic acid to riboflavin, etc. Proteolytic enzymes can liberate erythrobin, red, which oxidizes in air to blue product, probably corresponding to cyanobilin. A dialyzed soln. of phycoerythrin hydrolyzed by 15%  $HCl$  in the absence of air and treated with  $AmOH$  gives erythrobin in the org. phase; the product shows absorption max. at 496 m $\mu$ , its oxidation product at 600 m $\mu$ . G. M. K.

KLISHCHENKO, A. A., KOSCHUTSKAYA, L. M.

Chlorophyll

Special investigation of the state of chlorophyll on its formation in plants and in colloidal solutions of the substance of etiolated leaves. Dokl. AN SSSR 35 no. 1, 1952.

Monthly List of Russian Accessions, Library of Congress, November 1952. Unclassified.

*Chlorophyll in solution*  
*Journal - 11*

The nature of natural state of bacteriochlorophyll in connection with spectral properties of its colloidal solutions and solid films. A. A. Krasnovskii, K. K. Voinovskaya, and I. M. Kozubitskaya (A. A. Zhdanovskii Biochem. Inst., Moscow) *Doklady Akad. Nauk S.S.S.R.* 65, 390 (1952).—Solid films of bacteriochlorophyll (from purple bacteria, cf. C.A. 46, 46087) show absorption max. at 800 and 850 mμ; at 60° the 1st max. is intensified, the latter is depressed; cooling causes reversion to original. Adsorption of water shifts the 850 max. to 870; in the presence of urea this shift is to 890 mμ. True solns. of the product show 1 max. at 780-790 mμ. Bacteriochlorophyll in colloidal solns. (soln. in water and coagulated by  $MgCl_2$  or prepd. by dieth. or org. soln. with  $H_2O$ ), then coagulated as above) gives max. at 800 and 850. Suspension of macerated bacterial matter, after centrifuging and grinding at pH 6.5, shows 3 max.; heating to 60-80° shifts absorption toward 800, and at 100° the shift is to 770 mμ, indicating complete disaggregation and soln. of the

chlorophyll in the lipid phase. Acids cause a decline of the 800 and 850 max. and a rise of 850 max. owing to formation of bacteriochlorophyllin. Solvents ( $MeOH$ ,  $Me_2CO$ , pyridine, dioxane) lower all max. Generally, the 780-800 max. is ascribed to the least aggregated form, that at 850-890 to the most aggregated form, possibly by coordination or H bonding. Since low aggregates of pheophytin are not seen in films or colloidal solns., the latter appear to require a binding via the central Mg atom. The various polymeric forms probably exist in equl. with the monomeric active form which operates in the photosynthetic processes, having absorption max. 780-790 mμ. (G. M. Kozubitskaya)

KRASNOVSKIY, A. A. and VOYNOVSKAYA, K. K.

"Participation of Bacteriochlorophyll and Chlorophyll in the Reactions of Photochemical Transfer of Hydrogen in Solutions," Dokl. Akd. Nauk SSSR, 87, No.1, pp. 109-112, 1952.

Inst. Biochemistry im. A. N. Bakh, AS USSR

Describe results of a systematic comparative investigation of photochemical redox reactions sensitized with bacteriochlorophyll, chlorophyll a, or the corresponding pheophytins in soln. Used as initial reducing agents ascorbic acid and  $\text{Na}_2\text{S}$ , as hydrogen accepters riboflavin, diphosphopyridinenucleotide, and safranin T. Conclude that transfer of H in bacterial photosynthesis proceeds as follows: H donor  $\rightarrow$  F  $\rightarrow$   $\rightarrow$  bacteriochlorophyll  $\rightarrow$  F'  $\rightarrow$  reaction of  $\text{CO}_2$  reduction (F are enzymatic and auxiliary redox systems).

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КРАСНОУДСКИЙ, Д. И.

(2)

Chem Abs

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Biological Chem

✓ The effect of solvents on the spectral properties and photochemical activity of chlorophyll in its native state. L. M. Kosobutskaya and A. A. Krasnovskiy (Acad. Sci. U.S.S.R., Moscow). *Biofizika* 14, 840-7 (1969). The methods used in the isolation and preservation of chloroplast substances and in the detn. of photochem. activity are described. The effect of pyridine, dioxane, alc., phenol and acids upon the spectral properties and photochem. activity of chloroplast substances was investigated. Generally, the following stages were observed in the reaction: a disaggregation of the colloidal state of chlorophyll, coagulation of the albumins and an extn. of the chlorophyll by the solvent. The photochem. activity of the chloroplast substances was usually lost in the first stage of the reaction.

H. S. Levine

KRASNOSVETLY, A. A.

Chemical Abst.  
Vol. 48 No. 9  
May 10, 1954  
Biological Chemistry

(3)  
A method for the isolation and the spectral properties of bacteriochlorophyll and bacteriopheophytin. K. K. Volnovskaya and A. A. Krasnovskii (A. N. Bakh Inst. Biochem., Acad. Sci. U.S.S.R., Moscow). *Biokhimiya* 18, 620-31 (1953).—A chromatographic method for the isolation of bacteriochlorophyll and pheophytin from photosynthesizing bacteria is described and spectra of these pigments are presented. B. S. Levine

SISAKYAN, N.M.; KRASHOVSKIY, A.A.; MIKHAYLOVA, Ye.S.; BRIN, G.P.

Interrelation of photochemical capacity and enzymatic processes. Biokhimiia  
18 no.6:725-731 N-D '53. (MIRA 6:12)

1. Institut biokhimii im.A.N.Bakha Akademii nauk SSSR, Moscow.  
(Photosynthesis) (Enzymes)

KRASNOVSKIY, A.A.; BRIN, G.P.

The nature of the activating action of bases on the reaction of reversible photochemical reduction of chlorophyll and pheophytin. Doklady Akad. Nauk S.S.S.R. 89, 527-30 '53. (MLRA 6:3)  
(CA 47 no.16:8195 '53)

KRASNOVSKIY, A.A.; KOSOBUTSKAYA, L.M.

Different states of chlorophyll in plant leaves. Doklady Akad. Nauk S.S.S.R.  
91, 343-6 '53. (MLR 6:6)  
(GA 47 no.21:11360 '53)

KRASNOVSKIY, A.A.; KOSOBUTSKAYA, L.M.; VOYNOVSKAYA, K.K.; TEREININ, A.N., akademik.

Active and inactive forms of protochlorophyll, chlorophyll, and bacterial chlorophyll in photosynthesizing organisms. Dokl.AN SSSR 92 no.6:1201-1204  
0 '53. (MLRA 6:10)

1. Akademiya nauk SSSR (for Terenin). (Chlorophyll) (Photosynthesis)

~~KRASNOSEKIL, A.A.~~; KUKHRINA, Ye.V.; NOVOSPASSKIY, V., redaktor;  
KIRSANOVA, N., tekhnicheskij redaktor.

[Labor hygiene.] Gigiena truda. Izd. 2-e, ispr. 1 dop. [Moskva]  
Izd-vo VTsSPS Profizdat, 1954. 62 p. (MLRA 8:3)  
(Occupational diseases)(Industrial hygiene)

KRASNOVSKIY, A. A.

Formation of chlorophyll in the colloidal solutions of etiolated leaves of the Lima bean plant. L. M. Koubuts-kaya and A. A. Krasnovskii (A. N. Bakh Inst. Biochem., Acad. Sci. U.S.S.R., Moscow). *Biokhimiya* 19, 37-44 (1964).—In colloidal (cell-free) solns. of etiolated leaves of Lima bean, in the presence of light, there occurs, at the expense of protochlorophyll, a protein-lipide-chlorophyll union having a max. absorption at 670 mμ. The conditions favoring this reaction were studied. B. S. Levine

(3)

KRASNOVSKIY, A. A.

The nature of crystalline formations of chlorophyll which precipitates in the system water-picoline-dioxane. A. A. Krasnovskiy and G. P. Brin (A. N. Bakh Biochem. Inst. Acad. Sci. U.S.S.R., Moscow). *Doklady Akad. Nauk S.S.S.R.*, 98, 811-14 (1954).—Sols. of chlorophylls a and b in EtOH, Me<sub>2</sub>CO, or Et<sub>2</sub>O yield films with absorption max. in the red, 675-7 mμ, while evapn. of dioxane solns. gives films with absorption max. 690 mμ; heating these films to 60-70° shifts the max. to 675-7 mμ. Sols. of chlorophyll in dioxane has absorption max. 684 mμ, while the colloidal solns. obtained by dial. with H<sub>2</sub>O have absorption max. 690 mμ. Thus chlorophyll shows most probable packing of mols. with absorption max. at 675-8 and 690 mμ. A soln. of plastid matter in aq. picoline or pyridine treated with dioxane leads to pptn. of green crystals of "chlorophyll-lipoprotein" (cf. Takashima, C.A.B. 62064). Treatment of chlorophylls a and b in 2-picoline with pH 7 phosphate buffer, followed after 0.5 hr. by dioxane, gave green crystals analogous to those described above. Prepn. from fresh clover or kidney-bean leaves showed that these crystals are nonprotein in nature and contain up to 80% chlorophyll after several reprecipitations. Absorption spectra show the presence of chlorophylls a and b but with differences: the original ppts. which still retain protein show a less intense absorption max., about 670 mμ, than do the reprecipitated protein-free specimens. The crystals are not those of a picoline complex since the base can be washed away without change of the form or behavior of the crystals; their characteristic absorption is at 690 mμ and they do not fluoresce. Heating to 80° displaces absorption max. to 675 mμ.

G. P. Kosolapoff

KRASNOVSKIY, A. A.

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Action of heavy water on the reaction of photoreduction of chlorophyll and the photochemical activity of the substance of green leaves. A. A. Krasnovskiy and G. P. Bilg (A. N. Bakh Inst. Biochem. Acad. Sci. U.S.S.R., Moscow). Doklady Akad. Nauk S.S.S.R. 66, 1026-8 (1981); cf. C.A. 44, 2802g. —The presence of  $D_2O$  affects the photochem. activity of green substance of the leaf (cucumber-leaf macerate), as shown by the reaction of reduction of indophenol, in such a way that  $D_2O$  hinders the reaction at 20° and 30°; the results given graphically for 16-100%  $D_2O$  clearly show the blocking action of  $D_2O$ . The temp. coeff. of the  $D_2O$  reaction is 2.1, against 1.2 for  $H_2O$ , indicating greater activation energy. Photoreduction of chlorophyll by ascorbic acid in pyridine to which 10% either  $H_2O$  or  $D_2O$  was added also shows a slower action of the  $D_2O$  system, both during the light phase and the dark phase of the reaction. Photoreduction of chlorophyll can be represented by the reaction of activated chlorophyll with intermediate oxidation-reduction systems under action of light to yield a chlorophyll neg. ion and ionically reduced form of the reductive system, which under the action of a suitable catalyst yields the reduced chlorophyll and the oxidized form of the reductive system. In photosynthesis there occurs a transfer of electrons and protons from  $H_2O$  into a system of consecutive reactions in which the intermediate reduction systems and enzymes take part in the reduction of  $CO_2$ . Chlorophyll participates in the dark-stage catalytic transfer of the protons. G. M. Kosolapoff

KRASNOVSKIY, A. A.

USSR/Chemistry - Biochemistry

Card : 1/1

Authors : Krasnovskiy, A. A. and Voynovskaya, K. K.

Title : Reversible photo-chemical reduction of porphyrin into chlorine and bacteriochlorine.

Periodical : Dokl. AN SSSR, 96, Ed. 6, 1209 - 1212, June 1954

Abstract : Report presents the results obtained during the investigation of the photo-reduction of hematoporphyrin which is a typical representative of the prophyrin group having no coordination bound central metal atom. The study of the reaction of photo-reduction of porphyrin into chlorine and bacterio-chlorine gives a better understanding of the biochemical nature of the bio-synthesis of chlorophyll and bacterio-chlorophyll. Nine references. Graphs.

Institution : Acad. of Sc. USSR, The A. N. Bakh Institute of Biochemistry

Presented by : Academician A. N. Terenin, March 20, 1954

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TREASURE ISLAND BOOK REVIEW

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KRASNOVSKIY, A. A. (Institute of Biochemistry, Academy of Sciences, USSR).

NEKOTORYYE VOPROSY FOTOKATALIZA (Some properties of photocatalysis). In Problemy kinetiki i kataliza (Problems of Kinetics and Catalysis), vol. 8. Izdatel'stvo Akademii Nauk SSSR, 1955. Section I: Effect of illumination on the adsorbability of solids. p. 40-42.

This is a review of some work conducted in 1937-1940. It was found that  $TiO_2$  and  $ZnO$  sensitize coating of paints containing these pigments. The photochemical activity of  $ZnO$  depends greatly on the method of production.  $TiO_2$  containing impurities showed a lower photochemical effect than pure  $TiO_2$ , f. ex., cobalt markedly lowered the photoactivity of  $TiO_2$ . The mechanism of the formation of hydrogen peroxide on  $ZnO$  was studied, but not definitely established. The effect of light on some catalytic reactions has also been studied, namely: oxidation of ascorbic acid, catalytic decomposition of hydrogen peroxide, and catalytic oxidation of unsaturated compounds. These reactions take place in the dark in the presence of phthalocyanines and of oxides of  $Zn$ ,  $Ti$ ,  $Pb$ ,  $Cu$ ,  $Fe$ , and  $Cr$ . Illumination accelerates the reactions only in the presence of oxides of  $Zn$ ,  $Ti$ ,  $Pb$  and  $Cu$ . 8 ref., all Russian (1940-1950).

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KRASNOVSKIY, A. A.

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Photochemical reactions sensitized by chlorophyll, its analogs, and derivatives. A. A. Krasnovskiy, Khim. Kinet., Kataliz i Reaktsii of Spontani. Akad. Nauk S.S.R., Dzel. Khim. Nauk 1955, 92-105. Summary report of previous work done by K., et al. (cf. C.A. 46, 45906; 47, 51847).—The general course of photochemical reactions with chlorophyll-like substances is: formation of photoactivated biradical of the chlorophyll, primary photoreaction with the reducing substance, back reaction of the reduced radical form of chlorophyll, and formation of final products by dismutation of free radical. G. M. K.

Smirnov

KRASNOVSKIY, A. A.  
USSR/Biology, Biochemistry

FD-2396

Card 1/1      Pub. 42-9/9

Author : Krasnovskiy, A. A.

Title : The participation of pigments in the photosynthesis reactions of plants

Periodical : Izv. AN SSSR. Ser. Biol. 2, 122-132, March-April, 1955

Abstract : A short resume is given concerning the problem of the biological nature of the participation of pigments in the photosynthesis reactions of plants based on work done by the author and his associates in recent years at the Laboratory of Photobiochemistry, Institute of Biochemistry imeni A. N. Bakh, Acad. Sci. USSR. This work was done with the aid of spectral methods, procedures using redox indicators, biochemical analysis and direct electrometric methods. The results are described. Diagrams. Forty references, twenty eight of these from the USSR (twenty six after 1940)

Institution: Institute of Biochemistry imeni A. N. Bakh, Acad Sci USSR

Submitted : October 10, 1954

KRASNOVSKIY, A-A.

USSR.

✓ The isolation of porphyrin from cultures of purple bacteria.  
K. K. Valnovskaya and A. A. Krasnovski (Inst. Biochem.,  
Acad. Sci. U.S.S.R., Moscow). *Biokhimiya* 20, 123-5  
(1955).—*Rhodospirillum rubrum* was grown in a medium contg.  
malic acid which stimulated the production of porphyrin.  
This substance was found in the medium fluid and in the  
bacterial bodies. A procedure is described for the isolation  
of porphyrin. The results of a study of its spectral and  
photochem. properties are discussed. B. S. Levine.

KRASNOVSKIY, A. A.

USSR/Biology - Biochemistry

Card 1/1 Pub. 22 - 30/45

Authors : Krasnovskiy, A. A.

Title : Photochemical reaction of chlorophyll with cytochromes

Periodical : Dok. AN SSSR 103/2, 283-286, Jul 11, 1955

Abstract : The reaction between chlorophyll and cytochrome was investigated by means of spectrophotometric measurements carried out on a Beckmann photo-electric device. Results obtained are presented in graphs. Fifteen references: 5 English, 1 USA, 1 Fr., and 8 USSR (1948-1954). Graphs.

Institution : Acad. of Sc., USSR, Inst. of Biochemistry im. A. N. Bakh

Presented by: Academician A. N. Terenin, March 22, 1955

KRAMOVSKIY, A.H.

MP ✓ Active form of chlorophyll in colloidal solutions of the green leaf matter and its reversible photochemical changes. A. A. Kramovskiy and L. M. Kosobutskaya. *Doklady Akad. Nauk S.S.S.R.* 104, 440-3 (1955).—A centrifuged green soln. obtained from homogenized leaves of sugar beet in phosphate buffer at pH 4.8 or 8.5 was mixed with 1.5 parts glycerol, yielding a rather viscous soln. which was suitable for low-temp. spectrometric work. Strong irradiation of this at constant temp. led to a slow fall of absorption in the red at pH 7 and a much more rapid fall at pH 8.5; indication of the shape of such a kinetic curve was that a relatively labile form of chlorophyll was present which was attacked by illumination within a few sec. The loss of the color was caused by an absorption shift of 1.5-2 mμ to the longer wave length. The loss of color was much faster at 30° than at 20°; at 40-5° the color loss was irreversible.

Illumination of the green soln. in contact with air led to rapid color loss in the red absorption max.; cutting off the light served to slightly increase this absorption for a few sec.; ascorbic acid also had a similar effect. The photo-oxidation and its reversal took place much more slowly at -40°. KOH-glycerol solns. of chlorophyll a and b also showed similar behavior, in which case glycerol appeared to act as the reducing agent. This reaction was accompanied by increased absorption at 320-350 mμ; reduction of the products led to a fall of this absorption. If air was thoroughly removed, the irreversible decoloration of the green soln. could not be observed; brief illumination lowered the red absorption; darkness caused its reversal. Thus, in absence of air a reversible photoreduction of chlorophyll took place by the H donors in the solvent. The photoactive chlorophyll form (monomer) is capable of reversible photochem. reactions (cf. Franck, *Symposia Soc. Rech. Biol.* 5, 16 (1951)).  
G. M. Kozlovskiy

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KR/ SNOVSKIY, A.A., UMRKHINA, A.V.

Formation of free radicals in the photochemical reduction of  
chlorophyll and of its analogs. Dokl. AN SSSR 104 no.6:882-885  
0 '55. (MLBA 9:3)

1. Institut biokhimi i imeni A.N. Bakha Akademii nauk SSSR.  
Predstavleno akademikom A.N. Tereninym.  
(RADICALS (CHEMISTRY)) (CHLOROPHYLL)

KRASNOVSKIY, A. A.

✓ The action of light upon the oxidative-reductive conversion of cytochrome and the sensitization of these reactions with chlorophyll and bacteriochlorophyll. A. A. Krasnovskiy and K. K. Volnovskaya (A. N. Bakh Blochem. Inst., Acad. Sci. U.S.S.R., Moscow). *Biofizika* 1, 120-6 (1956). —15 references.

A. Lasso

me 2

KRASNOVSKIY, A. A.

7 Spectrophotometric studies of the composition of chlorophyll in red alga *Chlorella*. A. A. Krasnovskiy, R. A. Nesterovskaya, and A. S. Goshenberg (A. N. Bakht Biochem. Inst. Acad. Sci. U.S.S.R., Moscow). *Mosk. 1*, 828-33 (1958). Krasnovskiy (Monography, Moscow (1954)) app. was used for spectrophotometric measurements. The studies were carried out with leaves of the algae and the solns. of the pigments in 80% acetone and MeOH at room temp., 40, 60, and 80°. The algae were collected from the depth of 20-5 m. of sea, from May to January. The 3 max. of absorption were found at 670, 675-1, and 685-90 mμ. The relative intensity of above absorpt. varied with the seasons. In the spring, together with the greater max. at 675-8 mμ, is present also max. at 690 mμ. In the fall both max. were moved to 676-8 mμ. The heating (5-15 min.) of algae to 60 and 80° produced the moving of the max. to 671-2 mμ. The solns. of chlorophyll (contg. both green and yellow pigments) in 80% acetone and MeOH from these algae gave only max. of absorption at 684 mμ, corresponding to chlorophyll a. Judged by the previous data, the presence of above 3 max. of absorption depends on variations in the degree of polymerization of chlorophyll in these algae.

A. V. Tolstopylov

KRASNOVSKIY, A.A.

2811. Photochemically active form of chlorophyll in leaves and its transformation. L. M. Vorobova and A. A. Krasnovsky *Biochimica et Biophysica Acta*, 1958, 14, 126-136 (Inst. of Biochem. Acad. Sci., Moscow, U.S.S.R.). In addition to the photochemically stable form of chlorophyll there is present in leaves an active form corresponding to fluorescent "monomers" chlorophyll soln. in organic solvents. Since fluorescence is exhibited only in fat solvents, it may arise on disaggregation of active chlorophyll which may be a chlorophyll-lipid or chlorophyll-lipoprotein complex. Rapid bleaching was observed (pH 4-5) of colloidal water-glycerol soln. of chlorophyll from sugar beet leaves on exposure to red light; fluorescence was reduced and the red light absorption max. shifted to higher  $\lambda$ . Higher pH causes the opposite shift and an increase in the rapidly bleaching form. Reversible oxidation-reduction reactions were observed in alternating light and dark periods. (Russian)

A. H. GRZYBOWSKI

KRASNOVSKIY, A.A.

The storing of energy in photochemical reactions of chlorophyll and its homologs. A. A. Krasnovskii (A. N. Bakh Biochem. Inst., Acad. Sci. U.S.S.R., Moscow). *Zhur. Fiz. Khim.* 30, 968-80 (1956). — A brief resumé of the work at the A. N. Bakh Institute since 1946 on the mechanism of storing energy, under the direction of A. N. Terenin. 71 references. W. M. Sternberg

KRACHINSKIY, A. A.

"The Reactions of Reversible Photochemical Reduction of Chlorophyll, its  
Analogues and Derivatives,"

*submitted*  
paper ~~presented~~ at the Intl. Symposium on Enzyme Chemistry, 16-23 Oct 57,  
Tokyo, Japan,

B-3,095,529, 9 Jan 58

"Participation of Chlorophyll in Photochemical Hydrogen (electron) Transfer,"  
paper presented at above Symposium.

B-3,098,405

IGASHOVSKIY, A. A.

"Development of the Mode of Action of the Photocatalytic System in Organisms," a paper presented at the International Symposium on the Origin of Life on the Earth, Aug 57, Moscow.

KRASNOVSKIY, Abram Adol'fovich; KARACHAROV, Troadiy Sergeyevich; VESELKINA,  
A.A., red.; MALEK, Z.N., tekhn.red.

[Work hygiene in manufacturing repairing, and charging lead  
batteries] Gigiena truda pri proizvodstve, remonte i zariadke  
svintsovykh akkumulyatorov. [Moskva] Izd-vo VTeSPS Profizdat, 1957.  
84 p. (MIRA 11:5)

(Storage batteries) (Industrial hygiene)

KRASNOVSKIY A.A.

USSR/Physiology of Plants - Photosynthesis.

I-1

Abs Jour : Ref Zhur - Biol., No 3, 1958, 10353

Author : Krasnovskiy, A.A., Vorob'yeva, L.M., Pakshina, Ye.V.

Inst : Institute of Biochemistry, Academy of Sciences USSR

Title : Investigation of the Photochemically Active Form of Chlorophyll in Plants of Various Systematic Groups.

Orig Pub : Fiziol. rasteniy, 1957, 4, No 2, 124-133

Abstract : Using as subjects of research plants of various systematic groups the absorption spectra in the red area of the spectrum and the kinetics of chlorophyll bleaching were investigated over the whole of the vegetation period. A detailed method of acquiring "green solutions" is given, as are measurements of the kinetics of bleaching and of the absorption spectra. Chlorophyll bleaching after irradiation with intense red light varied within the limits of 1-30%,

Card 1/2

APPROVED FOR RELEASE: Monday, July 31, 2000

CIA-RDP86-00513R0008

100

depending upon the plant; it was not correlated with their position in the system /sistematicheskoye polozheniye/. Beet, brache (Atriplex), marchantia, poplar, fern, and willow possessed the greatest bleaching intensity, while in most plants bleaching varied between 5% and 7%. In plants with the highest bleaching percent the absorption maximum was displaced several m into the short-wave part, thus confirming the presence of a large quantity of the monomeric (active) form of chlorophyll in their chloroplasts. When the monomeric form is separated by centrifugation from the more heavily aggregated form, the absorption maximum is displaced 2-6 m into the short-wave part. The bleaching process was invariably accompanied by displacement of the maximum into the long-wave part. In June and July there was 20-30% bleaching in the sugar beet, while it was only 3-6% in September and October. The project was completed in the Institute of Biochemistry, Academy of Sciences USSR.

Card 2/2

COUNTRY  
CATEGORY

USSR  
PLANT PHYSIOLOGY. Photosynthesis.

I

ABS. JOUR

REF ZHUR - BIOLOGIYA, NO. 4, 1959, No. 15250

AUTHOR

Brin, G.P.; Krasnovskiy, A.A.

INST.

Inst. of Biochemistry, AS USSR  
Investigation of Photooxidation Sensitized

COUNTRY :  
CATEGORY : PLANT PHYSIOLOGY. Photosynthesis.

ABS. JOUR. : REF ZHUR : BIOLOGIYA, NO. 4, 1959. No. 15250

AUTHOR :  
INST. :  
TITLE :

ORIG. PUB. :

ABSTRACT : as more active photosensitizers in the test-  
ed reactions. In the opinion of the author  
the process of photooxidation of organic  
compounds sensitized by means of pigments is  
comprised of a reaction in the light of pho-  
toreduction of the pigment and a reaction in  
the dark of  $O_2$  with the photoreduced form of  
pigment. In genuine reactions and colloid  
reactions obtained with the use of detergents  
chlorophyll has a high photochemical activi-

CARD: 2/3

4

KRASNOVSKIY, A.A.; VOYNOVSKAYA, K.K.

Reversible appearance of absorption bands within the red and near infrared region of the spectrum in the case of photoreduction of chlorophyll, protochlorophyll, and their analogues. Dokl. AN SSSR 112 no.5:911-914 F '57. (MLBA 10:4)

1. Institut biokhimii im. A.N. Bakha Akademii nauk SSSR. Predstavleno akademikom A.N. Tereninym.  
(Photosynthesis) (Chlorophyll)

*KRASHNOVITSKIY A.A.*  
LITVIN, F.F.; KRASHNOVSKIY, A.A.

Flourescence spectrum analysis of the intermediate stages of  
chlorophyll formation in etiolated leaves. Dokl. AN SSSR 117  
no.1:106-109 H-D '57. (MIRA 11:3)

1. Monkovskiy gosudarstvennyy universitet in. M.V.Lomonosova i  
Institut biokhimii im. A.N.Bokhn AN SSSR. Predstavleno akademikom  
A.N.Tereninym.  
(Chlorophyll--Spectra) (Etiolation)

KRASNOVSKIY, A.A.

## 231055712000

PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON ENZYME CHEMISTRY, Tokyo & Kyoto, 1967  
AUTHOR: Organizing Committee, International Symposium on Enzyme Chemistry, Tokyo, March, 1968.

## Participation of Chlorophyll in Photochemical Hydrogen (Electron) Transfer

**3**

2. Dombek, E. E., M. A. M., and R. P. P., *Trans. Faraday Soc. M.*, 49, 1790.
3. Pincus, A., *Progress in Molecular Biology* (New York, 1957), No. 3 (1957).

## REFERENCES

- Reich, A.-J. *Colloid Comp. Physiol.* 14, 327 (1936).

## Participation of Chlorophyll in Photochemical Hydrogen (Electron) Transfer

## ACKNOWLEDGMENTS

at the University of Southern California, Los Angeles, U. S. S. A.

*The Reactions of Reversible Phases Arising from  
Methyl Acrylate and Derivatives*

[illegible][illegible]

method (1). The photoconductance of chlorophyll *a* in different media was measured by a number of methods by observing the change in optical density of the solution. The method is based on absorption spectra, by measuring the percentage of light absorbed by the reaction medium. The method is not suitable for all media, e.g., in the case of a non-electrolyte or a reaction system, etc. We carried out a comparative study of the properties of chlorophyll *a* in different media, and the results of the study of chlorophyll *a* and of other pigments—its derivatives and analogues—showed that the photoconductance of different groups of substances is not the same, and that the photoconductance is not suitable for these reactions.

The further study of the mechanism of photoreduction of the azobenzene derivatives has been carried out by J. Langmuir and C. G. Overton in my laboratory (19). It was found that the reaction involves the formation of a complex of an electron by the pigment molecule in a hydrogen-bonded state (according to Forman (11),  $\text{H}^+$  is transferred from the azobenzene to the electron). The mechanism of the reaction is a proton transfer. The reaction is represented by a number of methods. Thus, the reaction scheme is modified to  $-40^\circ\text{C}$ . on the case

[illegible][illegible]

A general diagram of the reaction is written on Figures 1 and 2.

$$X + \text{Br}_2 \rightarrow X^+ + \text{Br}^-$$

$$X + \text{AlH}_3 \rightarrow X^+ + \text{AlH}_2^-$$

$$X + \text{AlH}_2 \rightarrow X^+ + \text{AlH}^- + \text{H}^+$$

1. Chlorophyll molecule, AlH<sub>3</sub>, molecule of the hydrogen chloride.

2. Chlorophyll fluorescence and hydrogen chloride ions: *Fluorescence* from chlorophyll molecule and *hydrogen chloride* from chlorophyll molecule.

3. In the case of chlorophyll, the reaction is written as follows:

$$\text{Chlorophyll} + \text{Br}_2 \rightarrow \text{Chlorophyll}^+ + \text{Br}^-$$

$$\text{Chlorophyll} + \text{AlH}_3 \rightarrow \text{Chlorophyll}^+ + \text{AlH}_2^-$$

$$\text{Chlorophyll} + \text{AlH}_2 \rightarrow \text{Chlorophyll}^+ + \text{AlH}^- + \text{H}^+$$

3. *Orthostylyl* suboxide,  $\text{AsI}_2$ , molecule of the hydrogen chloride

KRASNOVSKIY, A.A., UMRIKHINA, A.V.

Studying the formation of free radicals during photoreduction of chlorophyll and its analogues by the method of initiated chain polymerization. Biofizika 3 no.5:547-557 '58 (MIRA 11:10)

1. Institut biologicheskoy khimii imeni A.N. Bakha AN SSSR, Moskva.  
(CHLOROPHYLL,  
free radical form, in photosynthesis by chain  
polymerization method (Rus))

VOROB'YEVA, L.M., KRASNOVSKIY, A.A.

Reversible photoreduction of chlorophyll and sensitized reactions  
in homogenates of sugar beet leaves [with summary in English]  
Biokhimiia 23 no.5:760-771 S-O '58 (MIRA 11:11)

1. Institut biokhimii imeni A.N. Bakha AN SSSR, Moskva.  
(PLANTS, EFFECT OF LIGHT ON)  
(CHLOROPHYLL)  
(PLANTS, EFFECT OF ASCORBIC ACID ON)

AUTHORS: Krasnovskiy, A. A., Pakshina, Ye. V. 30V/20-120-3-40/67

TITLE: The Properties of Photoreduced Forms of Chlorophyll, Protochlorophyll and Haematoporphyrin, as Dependent Upon the Conditions of the Acid-Base Equilibrium (Svoystva fotovosstanovlennykh form khlorofilla, protokhlorofilla i gematoporfirina v svyazi s usloviyami kislotno-osnovnogo ravnovesiya)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol. 120, Nr 3, pp. 581-584 (USSR)

ABSTRACT: In the reaction of the reversible photoreduction of chlorophyll and of its analogues the excited molecule receives one electron from the donor molecule, a pair of ion radicals being formed by this process. This reaction is easily reversible and after the electron transfer an acid-base equilibrium is established according to the properties of the medium. The latter is connected with a subsequent proton transfer and with the formation of more stable reduced forms, which "accumulate" the energy of light quanta. An accumulation of such photoreduced pigment forms is only found in media with a certain basicity. The authors investigated the velocity of the reverse reaction of the photoreduced pigment

Card 1/4

SOV/20-120-3-40/67

The Properties of Photoreduced Forms of Chlorophyll, Protochlorophyll and Haematoporphyrin, as Dependent Upon the Conditions of the Acid-Base Equilibrium

forms and their absorption spectra in media with a varying basicity, in this instance proceeding from the same conceptions. For this purpose distilled pyridine and piperidine and ammonia water solution were used. An evacuated tube with a reaction mixture was illuminated by a cine-lamp with 500 Watts at 20° for the purpose of photoreduction. In a second experimental variant the base was only introduced after air had been admitted. It can be seen from Table 1 that the said reaction of chlorophyll regeneration from its photoreduced form with an absorption maximum at 520 mμ proceeds relatively slowly. After the introduction of a strong base (piperidine or ammonia) the absorption at 520 mμ drops rapidly, and the initial chlorophyll regenerates already during the first minute. A later introduction of oxygen does no longer change the absorption at 670 mμ and 520 mμ. Figure 2 shows the accelerating effect of piperidine and ammonia on the regeneration of the initial chlorophyll and of its photoreduced forms. Other experiments were conducted with the introduction of one of the mentioned bases into the reacting mixture after the reaction of photoreduction, the mixture being cooled to

Card 2/4

307/20-120-3-40/67

The Properties of Photoreduced Forms of Chlorophyll, Protochlorophyll and Haematoporphyrin, as Dependent Upon the Conditions of the Acid-Base Equilibrium

..40<sup>0</sup>, and after atmospheric oxygen had been admitted to it. In this case the said reaction was markedly accelerated. Identical experiments with phaeophytine yielded no spectral changes, which would correspond to the spectrum of the primary forms (as in Ref 4). When phenylhydrazine was used for the reduction, the r-th form is produced, which after the addition of a few drops of piperidine is immediately transformed into chlorophyll. Thus it is just the bases which have an effect upon the reaction power of the reduced pigment forms. There are 4 figures and 7 references, 6 of which are Soviet.

ASSOCIATION: Institut biokhimii im. A. N. Bakha Akademii nauk SSSR  
(Institute of Biochemistry imeni A. N. Bakh, AS USSR)

PRESENTED: January 2, 1958, by A. N. Terenin, Member, Academy of Sciences, USSR

Card 3/4

AUTHORS: Litvin, F. P., Krasnovskiy, A. A. 954/26-126-4-21/67

TITLE: The investigation of Fluorescence spectra of the Leaves of Plants Within the 400-850 mμ Range (Issledovaniye spektrov fluoretsentell list'ey rasteniy v oblasti 400-850 mμ)

PERIODICAL: Doklady Akademii nauk SSSR, 1968, Vol. 126, Nr 4, pp.764-767 (USSR)

ABSTRACT: The present paper investigates the fluorescence spectra of etiolated and green leaves in the visible and near infrared spectral range (400-850 mμ) by photographic and photoelectric methods at room temperatures as well as at low temperatures. Green leaves of 5 to 20 days old plants grown under luminescence lamps and etiolated leaves of the same plants grown in darkness at 20° were investigated. Fluorescence was excited by means of a mercury-quartz lamp. In the spectrum of the etiolated leaves the maxima were at 652, 655, 690 and 707 mμ; the maximum at 655 is the most intense. During the first minutes of the phototechnical stages of the biosynthesis of chlorophyll the fluorescence spectra of the leaves change considerably. The maxima for the green leaves are then

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SCG 20-100-4-21/67

The Investigation of Fluorescence Spectra of the Leaves of Plants Within the 400-850 mμ Range

given. The fluorescence of the leaves in the 400-800 mμ range was investigated photographically and photoelectrically. On the background of a general weakening of fluorescence in the direction of longer wavelengths well reproducible maxima are found. The general course taken by the spectral curves of the etiolated and green leaves differs somewhat, but the maxima mentioned are maintained in both cases. With cooling down fluorescence is intensified and the maxima become more pronounced. Also at 500-800 mμ several fluorescence maxima occur. The fluorescence of leaves in the short-wave and in the middle section of the spectrum becomes more intense with increasing age of the leaves. The fluorescence spectra of the etiolated and green leaves in the short-wave part of the spectrum are very difficult to interpret. There are 4 figures, 1 table, and 11 references, 2 of which are Soviet.

Card 2/3

The Investigation of Fluorescence Spectra of the ...  
the 400-850 nm Range

ASSOCIATION: Moskovskiy gosudarstvennyy universitet L. M. V. ...  
Moscow State University ...  
Institut biokhimii im. A. N. Bakha ...  
(Institute of Biochemistry ...)

PRESENTED: February 4, 1958, by A. N. ...  
Science, USSR

SUBMITTED: January 16, 1958

1. Plants--Fluorescence 2. Plants--Spectra 3. Fluorescence  
--Temperature factors 4. Atomic spectra--Analysis 5. Light  
--Biochemical effects

Cord 5/5

17(3)

AUTHORS: Krasnovskiy, A. A., Umrikhina, A. V. SOV/20-122-6-29/49

TITLE: Application of the Compounds of Bivalent Iron and Ascorbic Acid as Electron Source in Photochemical Reactions of Porphyrins and Chlorophyll in Aqueous Media (Ispol'zovaniye soyedineniy dvukhvalentnogo zheleza i askorbinovoy kisloty v kachestve donorov elektrona pri fotokhimicheskikh reaktsiyakh porfirinov i khlorofilla v vodnykh sredakh)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 6, pp 1061-1064 (USSR)

ABSTRACT: The photochemical reduction of chlorophyll is observed most distinctly when using ascorbic acid as electron source ( $E'_0 = +0.05$  V), while the separation of oxygen of water in photosynthesis corresponds to the value  $E'_0 = +0.8$  V. Therefore it is necessary to determine the limits of the redox potential of the source systems of the electron, which systems are capable of a photochemical interaction with chlorophyll and its analogs. In the investigation of the photo-sensitized polymerization of the methyl methacrylate (Ref 1), the authors have ascertained that the chlorophyll

Card 1/4

Application of the Compounds of Bivalent Iron and SOV/20-122-6-29/49  
 Ascorbic Acid as Electron Source in Photochemical Reactions of  
 Porphyrins and Chlorophyll in Aqueous Media

compounds system of bivalent iron under illumination with red light initiates the polymerization. This indicates the possibility of an elementary "photoreduction" - the electron transition from  $Fe^{2+}$  to the excited chlorophyll molecule with formation of an ion radical (of the reduced chlorophyll form). By the work of the laboratory of the authors it was demonstrated that the oxidized and reduced cytochrome ( $E' = +0.26$  V) are capable of the redox transformations sensitized by chlorophyll (Ref 2). Previously it was shown that porphyrins are capable of a reversible "photoreduction" (Ref 3). But the capability of these pigments of being reduced by ascorbic acid in aqueous media had to be checked. The experiments have shown that in aqueous solutions of sulfuric acid a reduced form with an absorption maximum at  $500\text{ m}\mu$  is formed. But the initial porphyrin has two absorption maxima in this medium and in the range of  $450-600\text{ m}\mu$  has: at  $590$  and at  $545\text{ m}\mu$  (Fig 1 a). The reverse reaction takes place slowly in the presence of air and in the dark. From the results obtained the authors come to the

Card 2/4

Application of the Compounds of Bivalent Iron and SOV/20-122-6-29/49  
Ascorbic Acid as Electron Source in Photochemical Reactions of  
Porphyrins and Chlorophyll in Aqueous Media

following conclusion: porphyrins are capable of a reversible "photoreduction" in aqueous acid solutions. They took part in photo-sensitized transfer reactions of the electron from iron ions and from the ions of ascorbic acid to the azo-dye methyl red; finally it was demonstrated that chlorophyll took part in reactions of this type. A. N. Terenin, Academician, followed these investigations with interest. There are 4 figures and 9 references, 7 of which are Soviet.

ASSOCIATION: Institut biokhimii im. A. N. Bakha Akademii nauk SSSR  
(Institute of Biochemistry imeni A. N. Bakh of the Academy of Sciences, USSR)

Card 3/4

*KRASNOVSKIY A.A.*  
KRASNOVSKY, A.A.

"Photochemistry of Chlorophyll and the State of Pigments in Photosynthesizing Organisms."

Paper submitted for the Int'l Botanical Congress, Montreal, Canada, 19-29 Aug 1959.

A.N. Bakh Inst. of Biochemistry, Academy of Sciences of U.S.S.R., Moscow.

KURSANOV, A.L., akademik, red.; NICHIPOROVICH, A.A., prof., red.;  
KRASHOVSKIY, A.A., prof., red.; RUBIN, B.A., prof., red.;  
BOYCHENKO, Ye.A., doktor biol.nauk, red.; OSIPOVA, O.P.,  
kand.biol.nauk, red.; KLESHNIN, A.F., red.izd-va; POLYAKOVA,  
T.V., tekhn.red.

[Problems of photosynthesis; reports at the Second All-Union  
Conference on Photosynthesis, Moscow, Jan.21-26, 1957] Problemy  
fotosinteza; doklady na II Vsesoiuznoi konferentsii po foto-  
sintezu, Moskva, 21-26 ianvaria 1957 g. Moskva, 1959. 747 p.  
(MIRA 12:12)

1. Akademiya nauk SSSR. Otdeleniye biologicheskikh nauk.  
(PHOTOSYNTHESIS---CONGRESSES)

KRASNOVSKIY, A.A.

Fluorescence of chlorophyll and photosynthesis. Biofizika 4  
no.1:3-18 Ja'59. (MIRA 12:1)

1. Institut biokhimii AN SSSR im. A.N. Bakha, Moskva.  
(CHLOROPHYLL,  
luminescence in photosynthesis,  
review (Rus))

BELAVTSEVA, Ye.M.; VOROB'YEVA, L.M.; KRASNOVSKIY, A.A.

Study of the structure of aggregated chlorophyll. Biofizika 4  
no.5:521-532 '59. (MIRA 14:6)

1. Institut biokhimii imeni A.N.Bakha AN SSSR, Moskva i Laboratoriya  
elektronnoy mikroskopii AN SSSR, Moskva.  
(CHLOROPHYLL)

24(7)

SOV/48-23-1-17/36

AUTHORS:

Litvin, F. F., Krasnovskiy, A. A.

TITLE:

Investigation of the Formation Process of Chlorophyll and Its State in Plant Leaves by Means of Fluorescence Spectra (Issledovaniye protsessa obrazovaniya khlorofilla i yego sostoyaniya v list'yakh rasteniy po spektram fluorescent-sentsii)

PERIODICAL:

Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 1, pp 82 - 85 (USSR)

ABSTRACT:

In the present paper the authors studied the photochemical stage of chlorophyll formation, in the green coloration of etiolated leaves and in their light. The fluorescence was excited within the spectral range 360 - 580 mμ. The investigation covered the leaves of beans, corn, rye and other plants. Three particular marked maxima were determined in the fluorescence spectra: at 633,655 and 703-705 mμ and a very indistinct one at 690-694 mμ. In the flare, the maxima varied already within one minute. The marked maxima quickly disappeared almost completely and that at 690 mμ became very distinct. With increasing flare a new maximum

Card 1/2

Investigation of the Formation Process of Chlorophyll and Its State in Plant Leaves by Means of Fluorescence Spectra SOV/48-23-1-17/36

developed within the range 675 mμ. The maxima 633 and 703-705 mμ belong to protochlorophyll and the maxima 655 and 690 mμ are characteristic of the chlorophyll pigment. According to the development of the 690 mμ maximum it is assumed that a primary pigment is produced. For studying the potential share of the fermentative system in the biosynthesis of chlorophyll also the short-wave spectra of the leaves were investigated. Also in this case a number of maxima were detected, i.e. at 410, 420, 455, 460 mμ, from among which those at 440, 455-460 mμ are attributed to pyridine nucleotide in free state and in a form bound to the apoferritin. Furthermore, the possibility is discussed that the short-wave maxima might be produced by cellulose or such-like compounds. Within the medium-wave range a number of unidentifiable maxima (515-520, 555, 595 mμ) were found in addition. There are 1 table and 9 references, 2 of which are Soviet.

Card 2/2

SISAKYAN, N.M.; KRASNOVSKIY, A.A.; MIKHAYLOVA, Ye.S.; BRIN, G.P.

Photoreactivation of cytochrome oxidase activity in plant tissues containing and lacking chlorophyll [with summary in English]. Bio-khimiia 24 no.1:3-8 Ja-F '59. (MIRA 12:4)

1. Institute of Biochemistry, Academy of Sciences of the U.S.S.R., Moscow.

(CYTOCHROME OXIDASE)  
(PLANTS, EFFECT OF LIGHT ON)  
(CHLOROPHYLL)

BRIN, G.P.; KRASNOVSKIY, A.A.

Chlorophyll-induced photosensitization of oxidation-reduction conversions of pyridine nucleotides in chlorophyll solutions and leaf homogenates. *Biokhimiia* 24 no.6:1085-1093 N-D '59.

(MIRA 13:5)

1. Institute of Biochemistry, Academy of Sciences of the U.S.S.R., Moscow.

(CHLOROPHYLL chem.)

(NUCLEOSIDES AND NUCLEOTIDES chem.)

17(3)

SOV/20-127-3-63/71

AUTHORS: Litvin, F. F., Krasnovskiy, A. A., Rikhireva, G. T.

TITLE: Formation and Transformation of Proto-chlorophyll in Green Leaves of Plants

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 3, pp 699-701 (USSR)

ABSTRACT: It was proved that proto-chlorophyll is the immediate predecessor of chlorophyll with regard to the greening of etiolated leaves. The final stages of chlorophyll formation in the leaf are complicated processes; they include a number of intermediate stages of photo-chemical and fermentative types (Refs 1-6). Since all investigations with respect to the same subject were carried out with etiolated leaves grown from seeds in the dark the question arises whether proto-chlorophyll participates in the normal chlorophyll biosynthesis in plants grown in the light. It is difficult to solve this problem by the usual absorption methods of spectrophotometry because very small proto-chlorophyll quantities have to be determined against the background of high concentrations of the basic pigments of the leaf. For this reason the authors used the fluorescence spectra of the leaves with

Card 1/3

Formation and Transformation of Proto-chlorophyll  
in Green Leaves of Plants

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profound cooling of the object. The device used is described in references 3 and 4. Green leaves of the 7 to 15-day-old bean plants of the type "Severnaya zvezda" grown under day-light luminescence lamps were used in the basic investigations. The leaves were pulverized in a mortar, the pigments extracted by 4-5 ml acetone (80%), and the extract filtered. Liquid nitrogen was used for cooling. Figure 1 shows the microspectrogram of the fluorescence of such an extract from plants which remained in the dark for 4 hours (Curve 1) and that recorded after an additional 15-minute exposure to light (Curve 2). Figure 2 shows the fluorescence spectrum of a bean leaf similarly treated. Figure 3 shows such a spectrum of the cooled leaf (see above). The formation of active proto-chlorophyll in the same leaves can be seen from table 1. The authors succeeded in proving the formation of active forms of proto-chlorophyll in green plants by measuring the fluorescence spectra of the leaf extracts with

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profound cooling. By comparing the data obtained on the rate of proto-chlorophyll concentration with the data on the rate of chlorophyll restoration (by the isotope method (Ref 8)), it may be assumed that also active proto-chlorophyll forms take part in the chlorophyll biosynthesis of green leaves. There are 3 figures, 1 table, and 8 references, 4 of which are Soviet.

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AUTHORS: Krasnevskiy, A. A., Pakshina, Ye. V. SOV/20-127-4-53/60

TITLE: The Photochemical and Spectral Properties of Bacterioviridin of Green Sulphur Bacteria

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 127, Nr 4, pp 913 - 916 (USSR)

ABSTRACT: The bacteria mentioned in the title contain a green pigment - bacterioviridin (or chlorobium-chlorophyll) instead of bacteriochlorophyll, contrary to purple bacteria. It was to be expected that the great shift of the maximum of bacterioviridin into the i.-r. side (as in the case of bacteriochlorophyll) can be explained by the aggregation of pigment molecules in ordered structures. In the present paper the authors investigated the properties mentioned in the title in cells of living bacteria, in solid films, and in colloidal and genuine solutions. Absorption spectra of a bacterial suspension. The measurements in aqueous solutions (Fig 1) agree with those described earlier (Refs 5,6). With a 50% glycerin-content of the medium an additional maximum appears at 670 mμ in addition to the dominating maximum at

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730 mμ (in accordance with Ref 7). It seems to correspond to the "monomeric" form of the pigment. A disaggregating effect of glycerin cannot be assumed. Absorption spectra of genuine, colloidal solutions and solid (crystalline) films. A pure pigment separated from a culture of Chlorobium lamicola has an absorption spectrum similar to that of chlorophyll a. By pouring a few drops of the concentrated acetonic pigment solution into an excess of distilled water a colloidal solution is formed. Figure 1 shows the spectra. Fluorescence spectra (Yu. Yerokhin and I. Fedorovich took part in the measurements) were measured with freezing down to -150° according to a method already described (Ref 9). The monomeric (dissolved) as well as the aggregated forms of pigment are fluorescent. Further thorough investigations are still to be carried out. Photochemical properties. Similarly to chlorophyll a the pigment can be rephotoreduced by ascorbic acid or sodium sulfide (as electron donors) in pyridinic solution; the difference is that in this case more

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product of irreversible reduction are formed as in the case of chlorophyll a (Fig 2). In the presence of the oxygen of the air quick photochemical oxidation takes place in organic solvents (as bacteriochlorophyll). The pigment is more resistant in colloidal solutions and aqueous suspensions (Ref. 1,2). The photosensitized in solution by the pigment as by chlorophyll. The azo dye methyl-red is irreversibly photoreduced by the colloids of bacteriochlorophyll and bacteriochlorophyll as well as by bacterial suspensions in the presence of ascorbic acid if they are illuminated by a spectral part which is near the 1.-r.-region. V. N. Shaposhnikov and Ye. N. Kondrat'yeva, Katedra mikrobiologii MGU imeni Lomonosova (Chair of Microbiology of Moscow State University imeni Lomonosova) provided the Chlorobium lamula culture. There are 4 figures and 14 references, 10 of which are Soviet.

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(Gas welding and cutting--Hygienic aspects)